THE CHEMICAL AGE

VOL LVII 13 DECEMBER 1947 No 1483

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CHEMICAL PLANT

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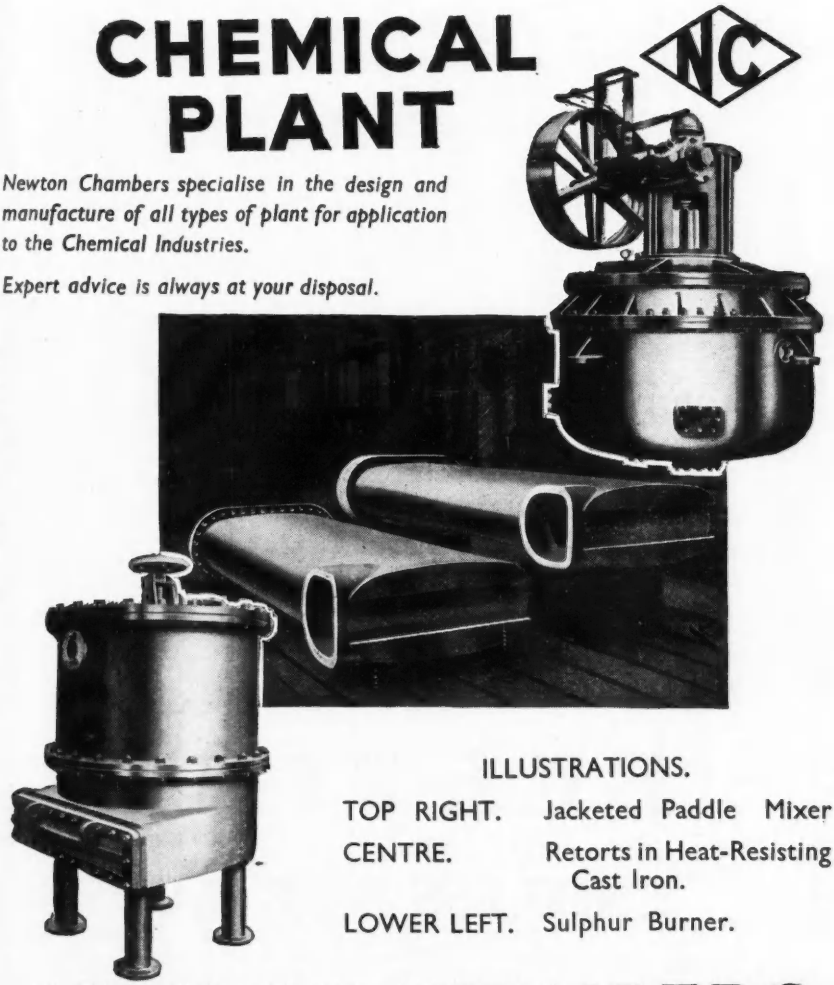

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TOP RIGHT. Jacketed Paddle Mixer

CENTRE. Retorts in Heat-Resisting Cast Iron.

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Rewards and Responsibilities

THIS is the day of the trade unions. The professional classes, harder pressed than ever before by burdens of taxation and of the privileges to organised workers, may be excused for doubting that the poor rewards of the professions, after deduction of income tax, repay the acceptance of responsibility that accompanies professional, managerial, administrative or executive posts. Professional classes as a whole are beginning to take this matter seriously; but there are exceptions, and predominant among these are the chemists. Part of the difficulty is that chemistry is not yet a self-sufficient profession. Unlike doctors, accountants, surveyors and their like, the majority of chemists look upon their profession as a stepping stone, not as an end in itself. The engineer who becomes a manager remains an engineer. Not so the chemist. Once he becomes a manager he ceases to handle the tools of his calling.

There are exceptions, of course; some chemists become heads of large laboratories, directors of research, chief chemists of great firms, or teachers. They are the minority and are in any case least likely to lead a movement for collective security.

Mr. Norman Sheldon, the president of the British Association of Chemists, in Manchester in October, emphasised the need for proper organisation of the chemical profession to provide it with the wherewithal to attract the best brains in the country. He is not alone in advocating this. Every profession and every industry is striving to attract young men of high calibre.

What sort of rewards must chemistry offer to attract those desirable entrants? Some would have it that it is Economic Security. Our view is that the best brains do not look primarily for security and never have done. It is the consolation of the second-best.

Not many years ago—and no doubt this is equally true of the better types today—young men did not ask what salary they would get on attaining a given age; they asked what were the prospects of the job. They were not concerned merely to attain the mean level of employment, they were seeking what the best will always seek—the spur for the best brains—*opportunity*, that magic quality that made the 19th century so vitally alive.

Nevertheless, it would be idle to pretend there is not a majority who must remain satisfied with posts of lesser responsibility. Every soldier's knapsack may contain a field-marshal's baton in theory, but many soldiers end in the Corps of Commissionaires. The profession must attract this type as well, since they too are essential and the best must rise from the mass by processes of natural selection. The profession must look after the interests of its less successful members. Here then is yet another reason why the profession of chemistry should be organised; to provide a competence to the competent as well as opportunity for the brilliant.

Meanwhile, there is no evidence that anything substantial is being done or is likely to be done to organise the profession. The Institute of Chemistry appears to live in the professional past, admittedly "a professional body of the highest standing," but not an effective champion of the

On Other Pages

chemist. It is not alone in this. A professional body may well be prevented by its constitution from taking a hand in "trade union matters." If so, it should not evade the issue and should enable some other body to take the necessary action.

As we understand Mr. Sheldon, the B.A.C. is waiting in the hope that the R.I.C. and itself will "together plan some form of co-operation for the benefit of all chemists." Let the R.I.C. state its position now, or it will be too late.

The same state of affairs has been faced in other industries. In the coal industry, the National Association of Colliery Managers found itself unable to undertake trade union work and the British Association of Colliery Management was formed to do so. In the gas industry, the Institution of Gas Engineers likewise stepped out of that field by reason of its constitution and the Gas Engineers' National Guild was formed to do that part of the work for senior executives and the British Gas Staffs' Association for the juniors. Why cannot chemists take similar energetic action? By their inaction as a body they have lent some substance to the ancient jibe of the engineers of ineffectiveness and unpracticality.

Can no one give a lead that chemists will follow? Can there not be a Joint Industrial Council for Chemists? We know the difficulty, and it is very real. It is that chemists are engaged in many industries and that each industry, rather than each profession, will tend to claim allegiance. If this is allowed to develop chemists will be submerged in the trade unions of their industries and will never again speak as a body. That is happening now, and unless a purely professional trade union such as the B.A.C. or the A.S.W. takes a firm lead, the opportunity of welding the profession into an economic whole will be gone beyond recall.

"Chemical Age" Year Book

THE 1948 CHEMICAL AGE Year Book has, unlike many essential works of reference, bettered previous records by making its appearance several weeks before the advent of the New Year produces the usual request for its services. Some copies have already been distributed and, although contemporary difficulties in printing, binding and paper supply preclude its simultaneous presentation to all who need it, no subscriber should now have to wait long for his copy. Amid the uncertainty of material and mechanical supplies, additional importance attaches to the 35 pp. Buyers' Guide in which are set out, separately classified, the names of principal manufacturers and suppliers of chemicals and of plant and equipment and the productions in which they are chiefly concerned. The many requests for such information received in the normal course of events testifies that the revised data now provided will be fully employed. In addition to the familiar chapters of classified information and diary, the latest Year Book has two new ones: a much needed guide to new companies registered, of which there were many in 1946; and a Samplers' and Assayers' Ready Reckoner.

NOTES AND COMMENTS

Factory Development Halted

NO more alarming evidence has been seen of what the chief critic of the present Government has characterised as its gross lack of foresight and incompetence than the circumstances which have led to the untimely decision to ban virtually all industrial building for at least six months. Behind the general explanation that this implements some of the provisions of the White Paper on capital investment lies the very evident fact that a Government which has intimately controlled the uses of all national steel supplies—and steel more than timber or labour is the controlling factor here—has so mishandled resources that, to use a commercial allegory, a petition to wind up should be the sequel. New building, expansion or reconstruction of chemical plants since the war have formed the subjects of more news items in THE CHEMICAL AGE than ever before and, thanks to the present irregular tempo in building, the majority of these undertakings cannot yet have reached completion. A substantial falling off of steel production might conceivably have justified freezing of industrial expansion, besides serving as a warning when plans were being made. The truth is precisely the opposite. Steel output in October was at the rate of 14.3 million tons per annum, compared with 13.8 million tons in September and 13.2 million tons a year before. Unless more realistic counsels prevail on the Government to redistribute what steel and other resources we have, to prevent unwarrantable loss of labour and materials, construction almost everywhere must be halted. The involuntary timing of this latest and most disconcerting revaluation by Sir Stafford Cripps, almost to coincide with the announcement of easier conditions for export trade in the American chemical market, lends weight to the widely held suspicion that a good deal of our national economy and its painful shortages are being accentuated by inspired mismanagement.

One of Many

A YARDSTICK by which may be measured the disruptive effect of this sudden interruption of development plans is the programme for expanding output of rayon and plastics outlined to shareholders of British Celanese, Ltd., shortly before the Government standstill order was announced. Substantial contributors to the country's export totals, British Celanese may, it is hoped, receive some preferential treatment; if it does not much of a planned expansion to cost £6 million will be stillborn. At the end of June contracts to the value of £1,451,000 of a £3,436,000 programme had been placed, much of it directed to increase the manufacture at Spondon of vital cellulose acetate and chemicals, " to be completed by the end of 1948." " Your board," said the British Celanese chairman, Mr. G. H. Whigham, outlining plans, " consider that your company is fortunate in being engaged in the rayon and plastics industries, both of which, in our opinion, are still capable of enormous development and expansion." Whether that expansion is now possible rests with Sir Stafford Cripps.

Nitrogen Targets

THERE have lately been several timely reminders that nitrogen in its many forms still has an importance transcending that of almost all other chemical substances. Civilisation is said to be poised—albeit somewhat precariously at the moment—on a complex of chemical substances: on nitrogen depends the maintenance of life itself. The fundamental rôle of nitrogen in world affairs receives recognition in the report of the Committee of European Economic Co-operaton, which has produced a programme for progressively increasing production by the 16 countries and their overseas territories collaborating, to conform with which nitrogen supplies would be more than doubled in three years. That assumes the provision under the Marshall plan of adequate financial aid to rehabilitate and extend existing production facilities and, an even less predictable factor, a full supply of coal and electric power. Nitrogen production by the 16 participating nations in 1946-7 is estimated to have been (in thousand tons) 961. The targets which the committee has set for the next four years (1947-8 to 1951) are 1217, 1481, 1721 and 2003. Uses of nitrogen, industrial and agricultural, will have risen from the current 1071 to 1895 thousand tons by 1951, permitting for the first time a surplus, on paper if not in fact. All

indications are, however, that European requirements of nitrogen are unlikely to keep within the bounds set by the nations' committee. Added to the mounting and insistent demand for fertiliser there are likely to be new claimants, one interesting example of which is contained in the current summary of four years' research by the Hannah Dairying Research Institute, referred to on another page. Judging by the promising results of laboratory and field tests, the conversion of nitrogen to human food is going soon to become a much more direct process by elimination of the plant food stage and incorporation of the N element, probably in the form of urea, in the protein cattle feed.

" End-Products " Priority

THE possibilities which may become realities if the policy of the Government to direct supplies chiefly to exporters is carried to extremes is receiving a good deal of anxious attention at the moment. Much that has been published on the subject has been frankly bewildering and the " explanation " by Sir Stafford Cripps reproduced in the current *Board of Trade Journal* is neither enlightening or reassuring. He says in effect that supplies for export will be scaled to the needs and output of manufacturers of end-products—finished goods—and that export priority accorded to supplies for sub-contractors will depend on the Government's assessment of the level required for the end-product stage. From the context, that very limited elucidation may be taken to refer specifically to steel and therefore can have added little to the confidence with which manufacturers of scientific instruments and components plan their campaign in the coming year. The possibility that more stringent conditions of supply might encourage the application of the rationing principle over a wider field cannot entirely be dismissed and the invidious position in which chemical industry as a whole would then be placed would make a tame acceptance of the principle of arbitrary Government distribution preposterous. Chemical industry makes few " end-products," yet without its aid few manufactures would ever reach the finished state. According to the current *Digest of Statistics* the industry employs "for export" only 68,800 of its 353,100 total labour force. No one, with the possible exception of the Ministry of Labour, can accept those figures as a true index of the industry's participation in export trade. The real extent of the chemical contribution to export production is deserving of the widest publicity, lest some ill-informed planner should mistake that statistical half-truth for reality.

African Oils and Vitamins

New Industry at Cape Town

A LARGE yield of vitamin A and of residual oils important to industry is likely to be produced early next year from the processing plant now nearing completion at Simonstown, near Cape Town, to work on the sharks and ling cod which are abundant in the Cape waters: employing the American Solexol process, the new plant will concentrate the vitamin segment of this crude oil, simultaneously decolorising, deodorising, and removing waxy substances. The final product; will be a clear, vitamin oil concentrate containing approximately 500,000 international units per gram of vitamin A. Output is expected to be large enough to provide export quantities. The residual oil, which amounts to over 90 per cent of the total, will be recovered in its original glyceride form and so can be used as such for a variety of purposes including poultry and animal feed and soap stock. It can be further processed to yield high quality oils useful for the manufacture of printing inks, linoleum, leather, and sulphonated oils.

U.S. Inorganic Chemicals

September Production Figures

ACCORDING to *Facts for Industry*, published by the U.S. Department of Commerce, production of inorganic chemicals in the U.S. during September was maintained at a high level, although total output declined slightly compared with August. Of the 35 industrial chemicals listed, 27 show an advance on September, 1946, while 22 have declined on August, 1947.

Production of synthetic anhydrous ammonia, ammonium nitrate solution, and nitric acid in September was the lowest of any month this year, although these chemicals show a better output than that of September last year. Chemicals produced in smaller quantities in September than in August, but larger than September last year include (in short tons) chlorine 116,451; hydrochloric acid 33,456; phosphoric acid 176,070; soda ash 687,413; caustic soda 211,154; sulphuric acid 2,289,572; nitric acid 59,900; and calcium carbide 47,177.

Chemical Trading Statistics

2900 More Workers for the Chemical Export Market

LATEST employment figures for the chemical industry contained in the November issue of the *Monthly Digest of Statistics*, published by H.M.S.O. for the Central Statistical Office, show that at the end of September there were 353,100 persons engaged in the production of chemicals, explosives, paints, oils, etc. Of that number, 238,900 were men, and 114,200 women. This represents an overall increase of 2400 workers compared with the August total. When war production virtually ceased in June, 1945, the labour force in the chemical industry was in the region of 438,100, a figure which had dropped to 335,800 by June, 1946. Since that date, however, monthly totals have indicated steady increases, the September figures being the nearest approach yet to those of June, 1945.

Export Orders

An interesting feature, and one that is perhaps unique as far as the major industries of this country are concerned, is the fact that 284,300 workers are engaged upon orders for the home market and supply departments, leaving only 68,800 for export orders. The latter figure is an increase of 2900 on the August totals, and may be taken to indicate that exports of chemicals may now commence to expand more noticeably. Nevertheless, the apparent disparity between the numbers occupied on home as compared with export orders continues to emphasise the dependence of home industries on chemicals.

Production figures for sulphuric acid and compound fertilisers serve to illustrate this, both commodities showing increases compared with last years' corresponding monthly totals, viz.: Sulphuric acid 121,700 tons (115,100), and compound fertilisers 126,200 (102,800). Consumption and stocks of the former appear steady, though more compound fertilisers were consumed during the month compared with the same period last year, and stocks have dropped considerably from 237,200 tons to 158,400.

GLASGOW TECHNICAL CENTRE

THE chemical engineering industry is fairly widely represented in the new "Engineering Centre," opened in Sauchiehall Street, Glasgow. The directors of the company responsible, in a three-storey building, have provided a useful display of engineering equipment. The opening ceremony was performed last week by Sir James Lithgow. On the ground floor are hydraulic and mechanical exhibits, on the first floor precision castings, bearings, metals, and scientific instruments. The second floor is to be devoted to electrical equipment, and the basement to heavy engineering plant, stokers, boilers, etc.

Of interest to the chemical industry are a considerable number of component and accessory manufacturers whose products are standard in the industry, manufacturers of heating and ventilating equipment, instrument recording firms, etc. Of direct chemical application are exhibits by Enamelled Metal Products (1933), Ltd., showing a glass-lined chemical unit, and by other firms in the Balfour group. Other chemical and allied displays are by Aeroplastics, Ltd., showing plastic components; Catalin, Ltd., cast plastics and synthetic resins; Fescol, Ltd., electro-chemical depositors; Ioco, Ltd., rubber and plastic products; H. Morris & Co., Ltd., showing laminated and densified woods.

CHEMICAL PRODUCTION AND USES—SEPTEMBER AND OCTOBER

	October, 1947 Thousand tons			October, 1946 Thousand tons		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Sulphuric acid	121.7	118†	54.5	115.1	122	54
Sulphur	—	21.3	60.9	—	18.2	62.2
Pyrites	—	17.6	75	—	15.9	63
Spent oxide	—	15.7	158.9	—	15.4	142.3
Molasses†	6.9	27.5*	120.1	5	34.5*	136.6
Industrial alcohol† (million bulk galls.)	1.96	2.28	5.48	2.30	2.25	1.33
Superphosphate†	77	79.8	99.5	74.7	80.5	114.2
Compound fertilisers†	126.2	109.3	158.4	102.8	76.5	237.2
Agricultural lime	—	327.1	—	—	259	—
Ammonia (weekly average)	—	5.76	—	—	5.89	4.06
Phosphate rock (agricultural)†	—	66.7	129.3	—	69	121.6
Phosphate rock (industrial)†	—	5.22	39.2	—	3.22	36
Virgin aluminium†	2.21	13.9	—	2.37	9.7	—
Magnesium†	—	—	—	0.17	0.19	—
Virgin copper†	—	31.1	96.3	—	29.6	94.7
Virgin zinc†	—	19.8	36.6	—	19.4	54.3
Refined lead†	—	19.4	39.0	—	17.9	19.8
Tin†	—	2.45	15.5	—	2.84	20.7
Zinc concentrates†	—	13.4	70.0	—	13.7	108

* Distilling only. † September.

Anglo-U.S. Merger

Colloidal Graphite Companies

THE two largest producers of colloidal graphite are united by the merger of Acheson Colloids, Ltd., of Great Britain, and the Acheson Colloids Corporation of America, which now come under the joint control of Mr. Howard A. Acheson, son of the founder of the two organisations. The present fusion marks forty years of separate, yet parallel, progress. In 1908, Dr. Edward G. Acheson established the Acheson Colloids Corporation at Port Huron, Michigan, and its counterpart in Britain, at Plymouth, in 1911. The English company will continue to manufacture and serve the United Kingdom, Europe, the British Commonwealth and certain other territories, while Acheson Colloids Corporation will cover the United States, Canada, Latin American countries, the Orient and wherever the American organisation can effect better contact. By this means "dag" colloids will have a world-wide distribution, and experience and technical research will be pooled.

Acheson Colloids, Ltd., will continue under the joint managership of Mr. E. G. Clarke and Mr. H. Higginbotham, the British directors, the control of the British and American organisations under Mr. Howard A. Acheson.

Boake Roberts' New Issue

Mr. E. J. Boake, chairman of E. Boake Roberts & Co., Ltd., has announced that the consent of the Capital Issue Committee has been received to an issue to shareholders of 150,000 new preference shares at 25s. per share and 150,000 new ordinary shares at 31s. 6d. per share. The new preference shares will be offered to the existing preferences shareholders in the proportion of 3 new shares for every 2 shares held, and the ordinary shares in the proportion of 3 new shares for every 4 ordinary shares of £1 each. Letters of Rights and an explanatory circular were posted last Wednesday. Part of the proceeds of these issues will be utilised for the provision of new plant and machinery, purchase of land for future expansion and for the increase of working capital.

I.C.I. Project Opposed.—Holmes (Westmorland) Parish Council has decided to protest to South Westmorland Rural Council against requisition by Imperial Chemical Industries, Ltd., of part of Holme Park Fell as a store for steel chemical containers. The parish council contends that the store would ruin one of the finest views of the district.

U.S. Aluminium

Rising Consumption, Declining Production

LATEST statistics released by the U.S. Bureau of Mines reveal that consumption of primary aluminium in the United States continues at an exceptionally high rate in the face of declining production. Figures for the month of September show that while only 43,228 short tons of primary aluminium were produced in that month (the lowest output for any month in 1947), consumption for the same month totalled 56,464 tons. As a result of this disparity, producers' stocks dropped for the second successive month, from 67,515 tons on hand at the end of August to 54,279 tons at the end of September. These figures imply that the industry is taking advantage of heavy demand to reduce the excessive stocks built up during the first part of the year. The demand for aluminium is also evident in the scrap market, where prices for most grades have increased slightly in the face of short supply. Secondary alloy ingot has been steady, both in price and production.

Foreign Trade

Imports of aluminium, which had been high earlier in the year, ceased altogether in August, and totalled only 51 tons in September. Exports, after reaching a peak in August, declined slightly during September, but were still well above the level of the first seven months. Movement of 3032 tons of alloy ingot and slab to Europe has been stressed by the Bureau of Mines, because the greater part of this quantity went to Germany and Italy and constituted the first post-war shipments of aluminium to those countries. Asia, South America, and Africa were again the main destinations of semi-fabricated shapes.

DUNLOP AUSTRALIAN PLANS

A NUMBER of new factories are to be erected for the Dunlop Rubber Co. in Australia as a successful outcome of experiments in decentralisation by the erection of the new weatherproofs factory at Wagga and the footwear factory at St. Mary's, New South Wales. A new factory is to be established at East Freemantle, Western Australia, and several factory buildings are planned for plastic footwear, garments and special mechanical rubber goods at Banks-town, New South Wales. A section of the Drummoyne factory is to be modernised, and Latex Products Pty., Ltd.—a subsidiary—is building a Dunlopillo factory at Annandale, New South Wales, as well as preparing pans for another at Melbourne. Battery Manufacturers Pty., Ltd., another subsidiary, proposes a new establishment at Sandringham, Victoria.

Wages on Points

Levers' New System for Office Staffs

MORE than 1700 office workers at the Port Sunlight factories of Lever Bros. and Unilever, Ltd., will shortly be paid on points. A similar system for 2000 process workers was started last April. The new plan was announced last week at a meeting of the Institute of Industrial Administration (Merseyside Centre), held in the Exchange Hotel, Liverpool. Mr. G. A. S. Nairn, chairman, said that for office workers the Factor Comparison method would be inappropriate. No rates for office employees were fixed by negotiation with the trade unions, so that it was not possible to select "key" jobs to use as a basis for comparison. An alternative kind of yardstick is to be used.

Rate for the Job

The scale of point values is based on the approximate average of a number of scales which have been used by firms in North America. The system is a valuation of the job, not of the man. It will do away with "birthday increments." The five main factors to be used, which necessarily differ from those used for process workers, are: the minimum required standard of education; the degree of skill needed; responsibility attaching to the job; effort—mental, and to a lesser degree, physical; surroundings or conditions under which the job is performed. In merit rating, points will be allocated for each six characteristics—mental aptitude, degree of accuracy, resourcefulness, preparedness to accept responsibility, co-operation and powers of concentration. Lord Leverhulme, governor of Lever Bros. and Unilever, Ltd., also addressed members of the Institute on the organisational structure of the companies.

A NEW BIKINI

THE U.S. Atomic Energy Commission has announced that construction has been started in Eniwetok atoll in the Marshall group of islands in the Pacific, of proving grounds for routine experiments and test of atomic weapons. Bikini, where atomic tests were conducted in the summer of 1946, has been rejected as unsuitable. The scientific and technical operations, says the A.E.C., will facilitate advances in peaceful as well as in military applications of atomic energy. All test operations will be under laboratory control conditions, with full security restrictions.

Eniwetok atoll has only 145 inhabitants, is isolated and there are hundreds of miles of open seas in the direction in which winds might carry radioactive particles. Inhabitants of the atoll will be reimbursed and re-established at their new location.

Full-Scale Production

Fuel and Chemical Processers' Achievement

REVIEWING the year's achievements by Low Temperature Carbonisation, Ltd. at the company's 30th annual general meeting in London last week, Col. W. A. Bristow attributed "the remarkable progress made" to:—

(1) Remarkable value of the low temperature carbonisation process, inasmuch as it converts very small coal into lumps of the finest smokeless fuel in addition to producing large quantities of chemicals and oils; and

(2) High operating efficiency of plant. All the company's works operate 168 hours per week all the year round, the actual weekly output being the maximum possible, which resulted in an operating index figure of 16,800. This compares with 44 hours per week in other industries at a 75 per cent full load, giving an operating index of 3300—less than one-fifth of L.T.C.'s operating efficiency. Further batteries of retorts are under construction and it was hoped to put them into production next year.

"We are still waiting for the completion of the plants for the new products we have evolved," said Col. Bristow, "including plasticisers, synthetic resins, chlorinated products, the higher phenols, etc., and when these are in operation sales will be materially increased. The contracts now outstanding total approximately £380,000."

MORE REPARATIONS: FRENCH ZONE

IN addition to eight departments of the Rheinfelden works and 30 departments of the Ludwigshafen works of I.G. Farbenindustrie A.G. and eight departments of the Degussa works at Constance and Oppau, the list of chemical plants to be dismantled in the French zone of Germany includes the following smaller plants: Degussa, Rheinfelden; Maerkische Seifenfabrik and Gebr. Kiefer, Lahr; Gebr. Dreher, Stockach; Kurt Kopperschmidt, Blumberg; Hirtler, Heitersheim; Beutler & Co., Lahr-Dillingen; Seifenfabrik Schneider, Horb; Oberschwaebische Sauerstoffwerke, Marstetten (Aitrach, Wuerttemberg); Raschig, Ludwigshafen; Ackermann & Schwind, Oggersheim (Palatinate); Schoepfer, Bohl (Palatinate); Siegert & Co., Neuwied; Sauerstoffwerke, Mainz; Gewerkschaft Siegtal, Entenauen; Remenol-Werke, Bendorf; Roehm & Haas, Worms; Chemische Fabrik Weinheim, Igelheim-on-Rhine; Boehringer & Soehne, Igelheim-on-Rhine; Knoll A.G., Ludwigshafen; Böving, Mainz; and Dyckerhoff Portland-Zementwerke A.G., Neuwied. No chemical plants in the Saar are included.

NITROGEN AS STOCKFEED

NOTEWORTHY progress of research in the use of synthetic nitrogen to supplement the greatly reduced protein rations available for dairy cattle and some other livestock is recorded in an interim report of the Hannah Dairy Research Institute on the work which was first undertaken in the war. The current report, summarising four years' findings, recalls that: One alternative to protein was to use synthetic nitrogen compounds which can readily be manufactured from atmospheric nitrogen. Such compounds, while valueless for non-ruminants, have been shown by the Institute, as well as by numerous workers overseas, to be capable of utilisation by ruminants such as the cow, the efficiency of utilisation being about 75 per cent of that of a first class protein.

Urea Used

In a previous report it was shown that this use of a simple compound, urea, was achieved by the conversion of the ingested urea into ammonia and the subsequent use of this compound by the rumen micro-organisms to build up their own cellular protein. It has now been possible not merely to correlate the synthesis of such protein with that of a starch-like polysaccharide and with the simultaneous multiplication of certain rumen bacteria, but to isolate the protein-rich material and determine its composition. In regard to proximate constituents it resembled a protein concentrate such as linseed cake, it containing about 36 per cent of protein, 10 per cent of fat, and 47 per cent of carbohydrate. Tests carried out with rats show that the protein is of high biological value.

In order to ensure that the results described above, which were obtained by *in vitrio* methods, are applicable to the animal, determinations have recently been made of the nature of the by-products occurring in the *in vitrio* experiments. The results show that these are of essentially the same nature as those found in the rumen itself, *i.e.*, carbon dioxide, methane and organic acids.

Two other incidental problems have, in the meantime, been investigated. One is concerned with the rate at which synthetic nitrogen compounds are absorbed after ingestion. It was felt that if such compounds could be retained for a longer period in the rumen itself, there would be better opportunity for the rumen bacteria to utilise them, and therefore a more efficient production of protein.

The second problem was concerned with the methods of incorporating synthetic nitrogen compounds into such feeding cubes. Experiments were carried out in which three nitrogen compounds were incorporated into cubes of various sizes and subsequently stored in bags of various types. When ammonium bicarbonate was used, the losses during both manufacture and storage were large. With urea the losses were negligible, provided precautions were taken to prevent any localised damping of the cubes, with consequent formation of mould.

BRITISH AND FOREIGN EQUIPMENT

TO most people, modern methods meant "speeding-up," "going automatic" or "mass-production," and to many these things suggested lowered quality and a departure from the days when cloth manufacturers were proud of their products, said Mr. E. Cotterill, Courtaulds, Ltd., when addressing the Macclesfield, Leek and District Section of the Textile Institute at Macclesfield last week on the subject of "Modern Trends in Textile Machinery."

Modernisation, he asserted, need not mean a reduction in quality. New machinery with which modern methods could be most advantageously worked were better machines than the old, and properly used and intelligently served, would do better work than the old. Most modern trends, he was sorry to say, came from outside this country, *i.e.*, from Europe (principally Switzerland, and to a lesser degree, France) and from the U.S.A. Rayon was largely a British product, and it was to be regretted that British machinists had been, in the main, slow to foresee its future.

Switzerland, aiming at the highest standards of quality, had built machinery which was probably the most complete and perfect of its kind. It was elaborate and full of refinements, and its significance was often difficult to grasp unless one had the mind and outlook of a Swiss or a European. On the other hand, there were the American machines, stripped of all that could not be justified in terms of "yards produced," yet equipped to give good service in the hands of people who had no time to spare.

Among the main features of new machines Mr. Cotterill instanced the use of new materials such as light alloys and plastics; electronics too were coming into use.

Indian Lac Exports Up.—India's shellac exports for October amounting to 19,368 tons were substantially higher than September shipments (14,568 tons). Seedlac shipments rose in the same period from 13,174 to 19,715 tons.

GAS PURIFICATION & REFRIGERATION

AMMONIA ABSORPTION PROCESS

REMOVAL of solid-forming vapours from gases in low-temperature plant has always demanded attention. Losses resulting from a shut-down of a large plant are extremely serious, leading to loss of efficiency and high costs. These well recognised facts provide the background against which contemporary developments in gas purification have to be studied. This was emphasised in the introduction to the paper presented to the Institution of Chemical Engineers on November 11 by Dr. T. A. Hall and Dr. G. G. Haselden, "The Purification of Gases in Low Temperature Processes."

In existing practice the following methods of gas purification are used :—

(i) Scrubbing out the vapours with a solvent.
(ii) Chemical removal.
(iii) Removal by adsorption.
(iv) Duplicating heat exchangers, using one at a time.
(v) Use of Frankl cold accumulators.
(vi) Use of Collins reversing exchanger.

These each have their disadvantage. The authors therefore investigated a process of cooling the gases by blowing cold gas directly into them. It was recognised that this was thermodynamically inefficient, leading to a considerable gain in entropy, but might in certain cases be justified.

Snow Filter

In a number of experiments water-saturated air was cooled in this way, producing snow crystals. These crystals could not be completely separated by cycloning but were removable by passing through a thin bed of the crystals themselves supported on wire gauze. The filter bed formed sharply at about -32 to $-34°$C. and when it was maintained at constant thickness by mechanical scraping it ran with constant back pressure and 100 per cent efficiency. Similar experiments were carried out with nitrogen bearing vapours of water and benzene. A number of calculations were given for the application of this principle to remove water and benzol from coal-gas or coke-oven gas, and lay-outs were suggested.

The principal application, however, was intended to be in conjunction with other low-temperature processes in a gas-separation plant.

Taking the cost of power as 0.5d. per kWh and of water as 2d. per 1000 gallons, the following costs were derived for two types of unit using this purification principle : Using an expansion turbine for separating out benzol from coal-gas running at 6 million cu. ft. per day at 15°C., 4.40d. per gallon produced; using a cascade system with auxiliary refrigerants (propane at 6 atmospheres, ethylene at 15 atmospheres) and the same conditions as before, the cost was calculated at 2.55d. per gallon benzol produced. Some sulphur removal is also likely. Both methods also rigorously dry the gas, increasing its calorific value and decreasing its corrosive properties.

During the same evening meeting of the Institution of Chemical Engineers, Dr. M. Ruhemann presented a group of three studies concerning the operation of the ammonia absorption type of refrigerator. The compression type of refrigerator has largely supplanted the absorption machine. The author intended to discuss comprehensively the various problems concerned with the latter, using very largely his own calculations.

Absorption Cycle Explained

The essence of the absorption cycle can best be understood by considering a compression machine driven by a steam engine. The latter absorbs heat at high temperature and rejects some of it at ambient temperature. The difference is made available as mechanical energy, performs work and drives the refrigerating machine. This machine rejects heat at ambient temperature and absorbs at a low temperature the difference between the rejected heat and the work performed upon it. Using the refrigeration term "production of cold," leads to this lucid picture :—

The steam engine absorbs heat and cold and produces mechanical energy; the refrigerating machine absorbs the mechanical energy and produces heat and cold.

The absorption refrigeration machine combines these two cycles in a simple process, cutting out the production and subsequent absorption of energy. Calculating the thermodynamic efficiencyy of this machine for a number of conditions the following results are obtained.

With the generator at 145°C., evaporator at $-45°$C., the theoretical performance varies from 150 per cent at a condenser and absorber temperature of 5°C., to 80 per cent at a temperature of 35°C. Alternatively, holding the condenser-absorber temperature constant at 22°C. (the generator still at 145°C.), efficiency varies between 80 per cent at $-60°$C. evaporator temperature and 240 per cent at $-10°$C. Practical figures are of course lower and for the case when theoretical performance is 100 per cent, a well-designed machine working between 145°C. and $-45°$C. will have an efficiency of about 65 per cent.

"Flash Drying"

Waste Recovery with Little Processing

PRACTICALLY instantaneous removal of moisture by the system known as "flash drying" has been described at a technical session of the American Society of Mechanical Engineers, which last week opened its 68th annual meeting in Atlantic City, New Jersey. "Installations of flash drying systems have resulted in large savings to industry through more economical processing and the recovery of waste," reported Mr. C. W. Gordon, manager of the flash drying division of Combustion Engineering Company, Inc., of New York City. Predicting a future for the system, he pointed out that the complex nature of materials used by modern industry presented many opportunities for the application of flash drying both for processing and for salvage or reclamation of otherwise waste materials.

Controlled Product

The new system employs the general principle of drying by vaporisation into air, and the equipment permits the product to be delivered at a specific moisture content in particle form ranging in size from fine to granular. Equipment is as follows: heater, wet feeder, mixer, agitator, collection systems, dry divider, cooling and transport system, and instruments and controls.

Drying of some materials requires the use of all this equipment, while others need only some, explained Mr. Gordon. Being simple in design and operation, the system responds rapidly to controls at the operator's fingertips. Owing to the speed of operation, there are only a few lb. of material in the system at any one time, and it is therefore possible to obtain very accurate control of the final moisture. Capacities of installations have so far ranged from 5-175 tons per hour. The immediate action takes place when the material is conducted into a turbulent stream of hot air with temperatures ranging up to 1300°F.

Among the materials now said to be processed in the flash drying system are many chemical and food products, and waste materials to which the method is applicable are sewage sludge, fines from coal mine washeries, wastes from food products and packing plants, spent grain from breweries and distilleries, and a large number of waste products from chemical and process plants.

In Chicago at present the sewage sludge is flash dried and sold as fertiliser, whereas at Buffalo it is flash dried and incinerated because the admixture of industrial wastes has robbed it of its commercial value. Mr. Gordon added that the incineration of many wastes will result in the liberation of a quantity of heat greatly in excess of that required for moisture evaporation from the material. This excess heat may be profitably used for steam generation.

Haifa Petroleum Project

6.5 m. Tons of Crude Oil Annually

THE Consolidated Refineries, Ltd., at Haifa, Palestine, has begun the construction of two additional cooling towers, setting into motion an expansion programme which will provide for the handling of greater quantities of crude oil when the new line to Haifa is in operation. It is expected that at the end of 1949 crude oil will be refined at the enlarged plant at the rate of 6.5 million tons annually, an increase of 2.5 million tons over the quantity refined at present.

Some of the new technical staff, who will number over 200 engineers, mechanics and foremen, have already arrived from the U.S. Most of the equipment has been ordered from Britain to specification provided by American companies.

Local representatives of the company were unable to comment on the possible effects on their programme of any political change now under consideration by the United Nations.

Furfural and Wax

The scheme includes a complete lubricating oil plant capable of producing over 2000 barrels daily of finished lubricating oil of various grades; crude distillation and vacuum units capable of handling over 80,000 barrels daily (a Badger design); one propane de-asphalting unit designed by the M. W. Kellogg Company; one furfural unit; one MEK dewaxing unit; one clay contacting unit—all three planned by Lummus Company, and the two cooling towers, which, like the ones in operation, will be 250 ft. high with a diameter of 226 ft. at the base and able to cool 2,000,000 gallons of water per hour.

No estimate of the cost of the construction scheme has so far been published by the company, but it is calculated that the amount will exceed by far the original investment which was about £5 million. The price of fuel and diesel oil is being increased throughout Palestine, fuel oil, previously £8 2s. per ton, by £1 per ton, and diesel oil by the same amount.

Utilisation of Ilmenite

According to a report issued by the U.S. Office of Technical Services, a German smelting process for the separation of the iron and titanium contained in ilmenite approaches this problem in a practical manner. It is said to produce good quality pig-iron, while the titanium may be used for the manufacture of paints, etc. Ilmenite, coal (or coke) and sodium hydroxide are heated to about 1400° C. in a furnace lined with magnesium oxide; iron and sodium titanate slag, forming two molten layers, may be drawn off afterwards.

THE CASE FOR THE HEAT PUMP

Substantial Economies in Treatment of Cooling Water

by J. BUTLER, A.M.I.Mech.E *

THE system—for extracting from cooling water the heat required for space heating purposes—is that performed by the reversed heat engine or heat pump as first indicated by Kelvin[1] in 1851 and further described by T. G. N. Haldane[2] in 1930. It shows that, provided low-grade heat is available, the process of up-grading this heat within certain temperature limits is an economical one for many uses. By the heat-pump method two to six times as much heat energy as that put in mechanically can be obtained, the balance being represented by the heat upgraded from the source of low-grade heat available.

RISING costs and reduced availability of fuel have rendered space heating of industrial premises a consideration of major importance and focussed attention upon the need for the utmost conservation of heat. One of the most promising means which has nevertheless received least attention is the heat pump as an agent making possible the recovery of heat from cooling waters on a scale no other existing method permits. Given here is a study by a practising engineer of the possibilities of adapting the heat pump to a specific industrial undertaking. The data he provides are applicable to many chemical and allied plants in which the economical uses of cooling water have not been fully explored.

Limited Development

Only about a score of heat pumps are known to be in use for space heating in the world, and as far as is known only one in this country. It is not easy on the surface to reconcile the great advantages claimed for the system with the small number of installations; one reason for this as far as this country is concerned is that until 1939 coal was cheap and that the capital cost for plant installed for space heating was much lower than that required for heat-pump principles, notwithstanding the extremely low efficiency of normal methods of degrading heat.

Furthermore, it is only in recent years that practical figures have become available to prove that the theoretical claims made for the system had any substance in fact. There is another point, which is that, in general, engineers were loath to accept without proof the fact that an engine could have an efficiency greater than 100 per cent.

By using the principle of the heat pump, heat is extracted from air or, better still, water, for instance in the form of river water, where the heat is present at a temperature too low to serve any useful purpose, and raised in the heat pump to a temperature sufficient to supply hot water and space-heating systems. It is, in fact, a form of refrigeration plant, except that its range of temperatures and pressures is wider.

Carnot states that in the perfect heat engine the thermal efficiency of converting heat into mechanical energy is given by

$$E = \frac{\text{Heat converted into work}}{\text{Heat taken by the engine}} = \frac{T1 - T2}{T1} \text{ (absolute temps.)} \quad . \quad (1)$$

In such an engine or cycle heat is supplied to the engine at high temperature, and after work has been performed on it heat at low temperature is rejected.

If by reversing the ideal heat-engine, heat is taken in at low temperature and work done on it to provide heat at a higher temperature we have

$$\frac{1}{E} = \frac{\text{High-temperature heat produced}}{\text{Work done to increase temperature}} = \frac{T1}{T1 - T2} \quad . \quad (2)$$

Potential Output

This is obviously an efficiency greater than 100 per cent, dependent on the temperature range. When it is realised also that the thermal efficiency of the perfect engine by the Carnot formula (1) is 15 per cent, where, for instance, T1 = 200° F. and T2 = 100° F., the high efficiency of the reversed cycle (2) which is the reciprocal of (1) can be appreciated.

In this case it would be $\frac{1}{0.15} = 660$ per cent.

In other words, if the electric energy required to perform the operation of the heat pump under the conditions of temperatures T1 and T2 mentioned, is, for instance, 20 kW

* Abstracted from "The Economical Use of Cooling Water for Heat Insulation of Presses and Subsequently for Space Heating," by J. Butler, A.M.I.Mech.E., Development Engineer for the publishers: British Industrial Plastics, Ltd., 1, Argyll St., London, W.1.

(68,300 B.Th.U. equivalent) in one hour, the heat delivered will be 68,300 × 6.6 =450,000 B.Th.U. per hour. Under actual working conditions losses of efficiency will occur by radiation, friction, etc., which in total will reduce the amount of heat delivered by something which may approach 50 per cent; it is certainly possible to obtain under these conditions 225,000 B.Th.U. in heat for the 68,300 B.Th.U. (20 kW) expended in work. Were that electric energy expended in the form of direct heating, by resistance heaters, for example, no more than 68,300 B.Th.U. of heat could be obtained compared with the 225,000 actually possible by the heat pump.

The maximum amount of heat available in the cooling water from the presses for any conceivable and suitable form of direct space heating is 166,000 B.Th.U. per hour, whereas there is available, above atmospheric temperature, at least 700,000 B.Th.U. per hour. If this heat be extracted by heat pump methods the economic utilisation of that heat becomes a possibility.

Method of Heat Extraction

A refrigerant in liquid form such as sulphur dioxide or dichloro-ethylene circulates in the closed system (the evaporator shell, the compressor and the condenser tubes). The cooling water is fed through the tubes in the evaporator and the water to be heated for the heating system is circulated through the condenser shell. The refrigerant (which has a low boiling-point) boils in the evaporator, extracting the latent heat of evaporation from the cooling water flowing through the tubes.

The vaporised refrigerant is then compressed in the compressor, raising the temperature of the vapour to 200° to 240° F., dependent on the refrigerant used and the pressure. The vapour passes at high temperature and pressure through the tubes of the condenser, where it reverts to its liquid state, giving up its latent heat to the water feeding the heating system. As the refrigerant passes through the expansion valve its pressure is reduced and the cycle thus becomes continuous.

There are many details which would have to be worked out before a concrete scheme could be laid out for the conditions of cooling-water volume and temperature and the water-heating requirements under review.

For the maximum economy in power of such a scheme the compression ratio of the gases through the compressor must of course be at a minimum. Accordingly, the corresponding temperature rise through the compressor will be at a minimum. The lower the temperature of the heating water, therefore, the less the system will cost in kWh compressor input energy and in capital cost.

There will be a " best " transfer medium or refrigerant, for instance one that boils at a temperature as low as possible, to abstract the maximum heat from the cooling water from the presses, without being so low as to necessitate a high waste of heat operating through the expansion valve.

If a highly suitable refrigerant can be utilised and the temperature of the heating system be limited to a maximum of, say, 165° F., allowing the use of radiators in the shops, it appears possible to instal a heat-pump system which would supply 850,000 B.Th.U. per hour of heat for heating the shops at a cost of approximately 45 kW per hour at the compressor (B.Th.U. equivalent = 153,000 B.Th.U.). The total of 850,000 B.Th.U. would consist of 700,000 from the press cooling water plus 150,000 approximately from the heat exchange at the compressor; an advantage or efficiency of 550 per cent. In working out actual details it may be found that the scheme briefly described herein, although carefully worked out, may not produce the efficiency mentioned. A more conservative estimate of 400 to 450 per cent, however, should be well within the bounds of practice, the scheme possessing the undoubted advantage that the source of heat (press cooling water) is at a considerably higher temperature than is the case in existing schemes where river water at 38° to 45° F. is the source of heat; in such existing cases the efficiencies obtained are between 230 and 300 per cent.

Economic Considerations

Sufficient, it is hoped, has been described to show the possibilities of the heat pump developing the heat content of the press cooling water to enable it to serve a purpose in heating systems. Capacity has been touched upon only so far as it will cope with the heat available in the cooling water: that capacity must first be considered in respect of the needs of a heating system and, secondly, savings and costs, revenue and capital need to be lined up.

The existing finishing, inspection, toolroom, and stores departments of the factory are typical and proportional in size, per number of presses operating, to similar plants within the industry. Therefore it is reasonable to assume that the figures herein, applying as they do to a factory of 150 presses, can be a guide to the requirements of other smaller or larger plants.

The cubic capacity of the factory buildings other than moulding shops and not including general offices is 670,000 cu. ft. The existing heating system is made up of (a) a basic system supplying approximately 1,000,000 B.Th.U. per hour and (b) heat as required to provide equable working conditions; the requirement varies, of course, with the outside atmospheric temperature.

System (a) comprises hot-water boiler feeding overhead pipes; and (b) is a low-pressure steam system of fan-type unit heaters. The latter system was designed to provide a maximum of 1,150,000 B.Th.U. per hour, assuming a system of efficiency of 100 per cent. With the more likely system efficiency of 70 to 80 per cent the maximum delivery expected was in the region of 900,000 B.Th.U.

From actual figures taken during extremely cold weather the maximum steam actually provided a delivery which is believed to be the maximum figure obtained, of 920,000 B.Th.U. per hour, assuming the same system efficiency. During the mild winter of 1945-6 this heating system was delivered rather less than 600,000 B.Th.U. per hour.

Raising Heat Output

It can be seen, therefore, that an estimated delivery from the heat-pump system of 850,000 B.Th.U. per hour is more than 90 per cent. sufficient for the needs of the factory. It is not wise to economise on heat supply to a heating system, so it is worth considering means of increasing the delivery of the system under consideration. At the same time, from actual experience a radiator system or, better still, a panel heating system imparts its heat more uniformly and with more noticeable effect than either overhead pipes or fan-unit heater systems in the shops concerned.

Ignoring that point, however, for the moment, means are sought to increase the delivery of the heat pump to between 900,000 and 1 million B.Th.U. per hour.

The obvious method is to attempt to increase the heat available at source, *i.e.*, the press cooling water by increasing its B.Th.U. content. This can be done by increasing the flow: more heat is absorbed by the water, but its temperature will be lower.

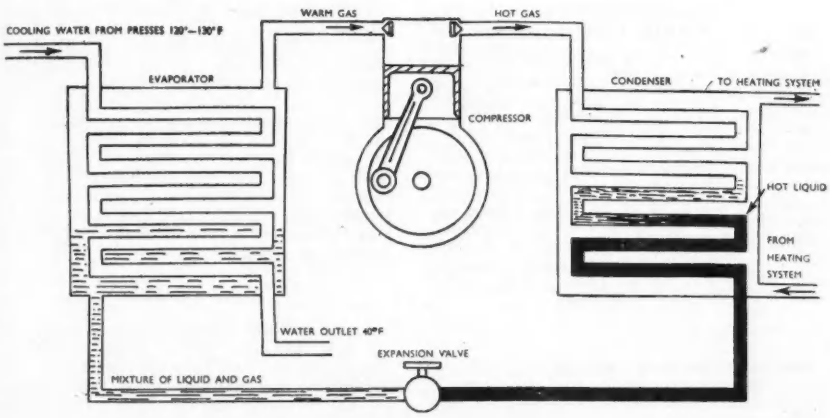
The compressor would need to be slightly larger, first in order to handle the additional heat units and secondly to accommodate the slightly greater load due to the temperature at the source being reduced.

Such a step is worth considering in some detail, as there is more involved than just increasing the cooling water flow. In the first place it is necessary to mention at this stage that the mere provision of pet cocks or valves as a control of water flow will not be good enough: very careful setting can too easily be altered by unauthorised persons. The best methods would be the fitting of throttling diaphragms in the feeds in conjunction with small stop valves. A guide to the diameter of holes needed for given water flows is included later.

Minimising Costs

In the second place, it will be wise to check up on the direction in which we are travelling. We commenced by attempting to prevent the overheating of presses by the use of cooling water, abstracting by that medium the heat that otherwise would flow into the press frame. It was found that the consumption of steam was very slightly increased by approximately 9d. per week per press, an amount which the author considers is justified. To avoid adding to that cost the cost of the cooling water used, it must be made capable of re-use. To do this the heat in the water must be dissipated and means of achieving that have been men-

(*Continued on page 760*)



Principle of the heat pump

tioned: a capital and running cost of water cooling equipment is entailed. Taking one step further to try and save not only the water but the heat in the water also, means were examined of using that heat which eventually led us into the consideration of the use of heat-pump principles. This showed us that most of the heat absorbed by the cooling water can be reclaimed, which, added to the heat derived by conversion of the mechanical energy at the compressor, gave us a delivery of heat for the cooling system almost completely sufficient for the needs of the supplementary heating system in this typical factory.

The last stage about to be considered is that of so increasing the heat absorption of the cooling water as to provide the slightly greater heat delivery required for the heating system.

As far as costs are concerned, the capital costs will be heavier than a normal heating system, but the running costs will be very much less. However, not only will the capital and running costs be slightly increased if a greater delivery is required, but as the greater heat content of the press cooling water can be achieved only by increasing the flow, a slightly greater cost of steam at the presses is entailed.

As there is every indication of fuel costs remaining very high for many years to come and as also it is shown as evident that the overall saving in fuel, whether in the form of electric current and/or coal, will be quite definite under heat-pump principles, there is still very much to be said for the system.

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[2] Haldane, T.G.N.: *Jnl. I.E.E.*, 1930, p.666, "The Heat Pump."

Heat Pump Performance

Despite scepticism at the time of its installation at Zurich in 1943, a heat pump has supplied practically all the heat required by the city's municipal buildings since that time, *i.e.*, between 10,000 and 14,000 B.Th.U. per year. Its predicted performance is reported to have been exceeded both in economy of operation and in heating capacity. River water of temperatures as low as 34°F. has been used, while water delivered to the heating system has reached 125°., resulting in a mean indoor temperature of 62½°F. On an average, 550 tons of coal per year have been saved.

Hungary Restricts Imports.—A list of goods which may not be imported to Hungary, unless under an existing trade agreement, includes hydrochloric acid, sulphur, caustic soda and some dyestuffs.

Another Transport Crisis?

Road Federation Warns Sir S. Cripps

THE reduction by 20,000 of the labour force engaged in road maintenance and construction in the U.K., following recent cuts of 40 per cent in grants, combined with the railway transport shortage, may have a disastrous effect upon industrial and other transport in the near future. This is the considered opinion of the British Road Federation, which sent the following resolution last week to Sir Stafford Cripps relating to the new cuts in capital expenditure:—

"The Road Maintenance Committee of the federation, having carefully considered the evidence placed before the federation by highway authorities throughout the country, believes that the Government has failed entirely to realise the implications of its present highway policy.

"The federation urges that H.M. Government reconsiders its decision in the light of the evidence now submitted, which shows that the proposed cuts in labour and maintenance work will have disastrous effects on agriculture and industry.

"In view of the warnings given by Ministers of a possible railway transport crisis, the roads will have to bear exceptionally heavy traffic, and the evidence collected by the federation on the state of the roads shows that expert opinion throughout the country is being ignored." The federation's view is strongly supported by extracts of opinions of local authorities which occupy 14 foolscap pages.

Home Tin Supplies

Tin stocks held by industry underwent marked depletion during October. This is shown by the figures recently issued by the Ministry of Supply, in which consumers' stocks at the beginning of October are given as 3082 tons and the estimated holdings at the end of the month 2708 tons. Stocks of tin held by the Ministry increased during the month from 6387 to 6438 tons; 2561 tons were produced and 2660 tons were consumed in this country. Deliveries to U.K. users totalled 2286 tons and 224 tons went for export. Stocks of tin ore held in October improved, in terms of tin content, from 6038 to 6537 tons.

Small Savings Quadrupled.—At the end of June the Post Office Savings Department ledgers recorded the total of 25½ million Savings Bank accounts with a total balance of nearly £2000 million. Before the war, the total balance amounted to £509 million pounds.

Potassium Permanganate & Manganese Chloride

F.I.A.T. Final Report Reviewed

THE production of potassium permanganate and manganese chloride at Bitterfeld is the subject of Report No. 757, which is issued with the usual warning regarding the possible infringement of existing patent rights.

Potassium permanganate is manufactured with the use of pyrolusite and 50 per cent potassium hydroxide as the raw materials. The porosity and hardness of the pyrolusite have considerable effect on the reaction, and experience shows that the Javanese material, which is of a softer grade, is very suitable. Dried ores containing less than 60-70 per cent of manganese dioxide, and therefore having a high percentage of impurities, cause encrustation of the heating coils in the evaporators owing to the deposition of silica and aluminium oxide.

The manufacturing process consists of fusing the pyrolusite with potassium hydroxide to form the corresponding manganate, which is oxidised to potassium permanganate in solution, the pure compound being obtained in crystalline form by evaporation of the liquor.

(1) $3K_2MnO_4 + 2CO_2 = 2KMnO_4 + MnO_2 + 2K_2CO_3$
(2) $2K_2MnO_4 + Cl_2 = 2KMnO_4 + 2KCl$
(3) $2K_2MnO_4 + O_2 + H_2O = 2KMnO_4 + 2KOH + O_2$
(4) $K_2MnO_4 + OH' \xrightarrow{\text{electrolytic oxidation}} KMnO_4 + KOH$

Method No. 3 is not used in industry owing to the expense of producing ozone, while No. 1, in which the manganate is oxidised by carbon dioxide, is also costly because one-third of the manganate is reduced to manganese dioxide. The electrolytic oxidation method (No. 4) is more economic than the chlorine oxidation process (No. 3) from an industrial point of view, because it yields potassium hydroxide as a by product, whereas the latter produces potassium chloride which has a lower market value than the hydroxide.

Addition of Potassium Hydroxide

Before fusion, the pyrolusite is ground so that 98 per cent passes a screen of 1600 meshes per sq. cm. A slurry of this sieved material is prepared and 50 per cent potassium hydroxide liquor added. The ratio of manganese dioxide to potassium hydroxide may be varied between 1 : 2.2 and 1 : 2.5, the exact proportion being dependent on the purity of the pyrolusite. The mass is fired in kilns with hydrogen or producer gas, and the slurry passed through a series of four kilns which convert about 90 per cent of the pyrolusite to manganate. Complete oxidation is obtained only if the atmosphere in the kilns has a sufficiently high humidity. If the percentage of potassium hydroxide is too high the potassium manganate may be dissociated in the kiln forming the manganite-manganate mixture.

Among noteworthy details given in the report are the following: Electrolysis is carried out batchwise in a large number of cells; cell voltage is 2.6 to 3 volts and a current of 1400 amperes is utilised; the process takes 48 hours to reduce the concentration of manganate from 200-225 g. per litre to 20-25 g. per litre. During this time the temperature rises from 40 to 70°C. Every half hour the contents of the cells are stirred to increase the quantity of manganate in solution. The cathodes are small iron rods which are surrounded by concentric nickel-plated anodes. The crystallisation process is not reported to involve novel features.

Manganese Chloride

No novel information has been obtained regarding the manufacture of manganese chloride. The reaction used is that based on the chlorination of manganese dioxide by means of hydrochloric acid, thus:—

$$MnO_2 + 4HCl = MnCl_2 + Cl_2 + 2H_2O$$

Excess acid is removed by the addition of manganese dioxide sludge and manganese carbonate, the latter reagent at the same time precipitating iron and aluminium impurities as the corresponding hydroxides. The chlorine formed is absorbed in a spray of milk of lime, this process being carried out in the usual towers.

KILBRIDE RESEARCH STATION

GIVING an account last week of the progress being made in establishing the research station at East Kilbride, Lanarkshire, Sir Patrick Dollan, chairman of the East Kilbride Development Corporation, described the project as one that "is expected to attract scientific and industrial leaders from all parts of the world." Sir Patrick said the corporation could provide accommodation at Thorntonhall early in January for research work in fuel, buildings, and roads. Plans were also being prepared for a mechanical engineering centre, which would be "not merely for Scotland but for the whole of Britain."

Provisional agreements had already been reached between representatives of the Corporation and officials of the Department of Scientific and Industrial Research over development work, and these would be discussed more fully at a conference at East Kilbride on December 16. The L.M.S.R. offices at Thorntonhall would form the first temporary laboratories of the Department of Scientific and Industrial Research.

French Sulphur Economy

Growing Importance of Gypsum and Lignite

ALTHOUGH gypsum as a source of sulphur or sulphuric acid is plentiful enough in France, other minerals such as pyrites have not so far been found in any considerable quantity. E. G. Voiret, writing in *Chim. et Ind.*, August, 1947, pp. 188-193, emphasises the importance of sulphur and its compounds in French industrial economy, pointing out that, for superphosphate production alone, some 900,000 tons of sulphuric acid were required before the war.

He reviews some possible native sources of sulphur, such as the Apt mines in Vaucluse, and the zones of Manosque and Narbonne; also sulphur-containing lignites in various parts of France, and suggests several ways of utilising these, supporting some of the ideas, which were propounded some months ago, such as: simple enrichment of the ore to a 35-45 per cent sulphur content for use in the vineyards; use of the American Frash method by water injection (though its application here is considered doubtful); or distillation of the sulphur ores in special furnaces as is done with pyroschists, *e.g.*, the Grand Paroisse type of furnace of 500 tons daily capacity.

Little Pyrites

French sources of pyrites are limited and do not yield more than about 200,000 tons per annum, so that before the war about 600,000 tons had be imported. The three principal pyritic zones in France are—Saint-Bel near Lyons containing up to 50 per cent sulphur and worked by the Saint Gobain Company up to 150,000 tons yearly; Chizeuil in Saône-et-Loire, worked by the same company up to 30,000 tons per annum (46-48 per cent sulphur); and the Soulier region, comprising the districts of Alès, Aubenas, and Privas. Here the sulphur content is lower, 34-40 per cent, and total output is 20,000 tons per annum, used by the Cie. Alais, Froges et Camargue.

It is thought that the fairly extensive pyritiferous deposits of Alès-Privas are well worth further study and survey; and possibly others at Fos in Haute-Garonne, Berchoux in le Rhône, and Morvan.

Voiret reverts to what he considers the most promising source of sulphur, including also fuel and fertilisers, namely, the extensive resources of lignite and low-grade coal which he has discussed at length in an earlier article.

He recalls the experience gained in Germany in this direction, using the Katasulf, Lcuna and other processes, mostly based on catalytic oxidation, the Alkazid method; and, in the U.S.A. the Koppers, Shell and Girbotol processes. The most suitable treatment would appear to be complete gasification with recovery of various fractions and the sulphur, and use of the residual gas under pressure as fuel. Sulphur content would range from 3 to 6 per cent, and is frequently present in the lignite in the form of pyrites, such as those of Var, Soissonnais, and others in Haute Saône and les Vosges. Many of these, says the author, remain still practically undeveloped despite many attempts.

Alternative Source of Acid

He considers next the production of sulphuric acid from gypsum, of which there are in France enormous deposits of high purity, capable of yielding up to 46 per cent acid. Most of the sulphuric acid required for fixation of synthetic ammonia in France is obtained from gypsum by double decomposition with ammonium carbonate solution and fine or colloidal gypsum suspension. Another method is that of direct production of sulphuric acid from the gypsum in the form of plaster of paris or the like, as practised on a large scale in Germany. A mixture of plaster, clay, and carbon or coke, is heated with excess air at 1000°C., yielding both sulphuric acid and cement. A large plant for this purpose was erected at Miramas, in France, in 1939.

In addition to these various ways of increasing supplies of sulphur and/or acid in France, Voiret offers other suggestions for their more economical or sparing use. Instead of using the relatively expensive pure sulphur in the vineyards and for other plant cultures, for example, it has been shown by research since 1940 that sulphur or its compounds in more attenuated form—lime-sulphur preparations, sulphonated terpinols, etc—will do just as well, or better. Superphosphate, moreover, is not necessarily the best medium for supplying phosphoric acid to plants, and there is no justification for employing vast quantities of sulphuric acid in its manufacture. Natural phosphates finely ground give equally good results; or they may be treated, *e.g.*, by alkaline fusion in the presence of silica, or in other ways.

Chemical Industry Transport

An all-purpose vehicle that may well attract the interest of chemical manufacturers is the Muir-Hill Dumper—there are three models, 10B, 14B, and 20B—recently on show at the Building Exhibition, Olympia. E. Boydell & Co., Ltd., have fulfilled large orders for the U.K. chemical industry.

South African Chemical Industries

"Potentially the Greatest in the World"

THE Liquid Fuel and Oil Industry Advisory Board, whose members have now been appointed, will shortly call for applications from industrialists who wish to make fuel oils from coal in South Africa. It seems that the Anglo-Transvaal Investment Co., Ltd., will be the only concern to make such application and that it will be granted before the end of the year. It is considered that this company will be able to establish plant and start production within two or three years. The urgency of establishing this new industry in South Africa is underlined by the statement made by the Minister of Economic Development that the world demand for petrol is exceeding the supply.

* * *

South Africa is potentially the greatest chemical industrial country in the world, claimed Mr. D. Jackson, an expert on coal and an M.P. for Ermelo, Transvaal. A period of unprecedented prosperity, he says, could be assured if the fuel from coal industry were fully developed and the by-products exploited. A plant already projected will be capable of producing 20 million gallons of petrol a year from low-grade coal. The Minister of Economic Development said recently that South Africa's present consumption of petrol is about 200 million gallons. From the by-products of the coal used in the recovery of the fuel, sufficient nitrates and ammonia could be pproduced to manufacture fertiliser to satisfy the Union's needs, said Mr. Jackson. This will obviate the necessity of importing the raw materials needed for the fertiliser industry. The establishment of nylon, plastic and dye industries would be made possible if the industry were developed correctly. Resin, now imported and used extensively in the production of paints and varnishes, is another of the many by-products of coal. Vereeniging is likely to be chosen as the site for the new industry. Methods developed during the war in Germany and elsewhere should be applied to the industry in South Africa.

* * *

Absence of a national road policy is blamed for a strange bitumen muddle in South Africa. While millions of gallons of road material are being imported from overseas, the Union is exporting a large proportion of its own production to France. Iscor has just shipped 1.4 million gallons of tar on the order of the French Government, and an East Rand refinery is preparing to ship a million gallons of bitumen and has been asked to double this quantity. Present consumption of these materials in South Africa is estimated at about 8 million gallons, but should be 12 million gallons with normal progress on national and other roads, with a peak of 17 million gallons by 1955. Production rate in South Africa by next January will be 4 million gallons of tar and 4.15 million gallons of bitumen, which is about the present consumption rate. Because production plans were made on a basis of local sales equalling output, the bitumen is run into steel drums as it comes from the retorts. Absence of other storage facilities is seriously handicapping plants, where upwards of 1 million gallons are at present lying unconsumed. Shortage of steel drums is also grave, and black market prices are being paid for the containers now that exports to France are necessary.

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Marble, Lime and Associated Industries, Ltd., of Johannesburg, has erected a new factory at Merebank, Durban, and has installed modern plant for the manufacture of chrome tanning salts, bichromates and chromic acid. These products are being exported.

* * *

Industrialists in America and Europe, faced with a critical shortage of chrome from local sources, are turning their attention to the Transvaal, where large deposits of high-grade ore are known to exist. American technologists who visited the Transvaal fields recently believe that the Union may soon be in a position to alleviate all world shortages. The latest figures show that chrome exports from the Union in the first three months of this year were 90,859 tons, valued at £204,963—almost double the 1946 figures for the same period—46,207 tons valued at £104,451. The largest buyer was the United States, which bought 83,945 tons, valued at £183,985. Local consumption for the same period was 3382 tons of the 48 per cent grade ore, valued at £7896. Despite the fact that the market for chrome ore is a highly competitive one and that the Union's competitors are geographically better placed in regard to consumers, the volume of sales depends in the final analysis on reducing mining and transport costs.

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The Chesebrough Manufacturing Co. is now established temporarily at 50 Crown Road, Fordsburg, Johannesburg, where for the time being they are planning to manufacture vaseline and other products. This factory covers an area of about 10,000 sq. ft.

* * *

The general stock position for chemicals in South Africa is now on a sound basis, and most industrial users of chemicals are experiencing little difficulty in obtaining full requirements. In many cases the industrial chemicals used in South Africa have to be imported.

OFFICIAL NOTICES

Plasterboard and Gypsum Rock.—The Ministry of Works has approved increases of ½d. a square yard in the price of wallboard and baseboard, and of 3s. 6d. a ton for gypsum rock, as from November 24.

Returned Exports.—As from November 26, announces the Board of Trade, the practice of permitting the re-entry without import licence of goods returned here after having been exported to sterling areas will be discontinued.

Oils and Fats.—The Ministry of Food announces that no changes will be made in the prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the four weeks ending December 27.

PVC Sheeting.—The maximum retail price of unprinted PVC sheeting weighing not more than 12 oz. per sq. yd. is increased as from December 8 from 6s. 8d. to 7s. 4d. per sq. yd., inclusive of purchase tax, now increased to 50 per cent. (S.R. & O. 1947, No. 2563—Amendment No. 2 Order.)

Surpluses from French Zone.—Included in a short list of materials stated now to be available in the French occupied zone of Germany are: Trisodium phosphate (crystal form), dyes, synthetic wax, kaurit glue, Luxmasse, bronze mesh for paper machinery, aluminium sheets (for packing) and machinery of various types. All transactions are controlled by the Office du Commerce Exterieur, Hauptstrasse, Baden Baden, French Zone of Germany.

Occupied Zone Requirements.—The Board of Trade announces that raw materials principally required at present by the combined Anglo-U.S. zones of Germany include aluminium, lead, zinc, hemp, wool, rubber, copper, tin, cotton, jute, pyrites, textile waste and rags. It is expected that purchases will be made by the Joint Export/Import Agency (U.S./U.K.) and offers should be made to the Import Section, Joint Export/Import Agency (U.S./U.K.), Hoechst, Frankfurt, 498 H.Q., C.C.G. (B.E.), B.A.O.R.21.

Iraqi Open Licences.—A new statutory regulation in Iraq permits the importation on open licence from any country, excepting Palestine and the scarce currency countries, of a substantial range of commodities including drugs and pharmaceuticals, chemical and pharmaceutical products, gum, casein, albumen and gelatine, utensils for chemical products, carboy containers for compressed and liquid gases, unworked copper, nickel, aluminium and lead, and certain fabricated articles, zinc and tin, and base metals and alloys, precision balances and thermometers.

TOWN'S PAINT PROBLEM

SOME months ago the cream paint on the outside walls of the permanent prefabricated houses of Warrington Corporation's Dallam Farm Estate—known as "Steel Town"—tenanted only this year, began to disappear. To-day, nearly 50 per cent are affected in varying degrees. The effect is as though a damp cloth had been wiped patchily down the steel walls while the paint was still wet. In two houses the paint had begun to peel off in spots, and the dark red undercoat is showing. Only a few yards away, in neighbouring avenues, the latest additions to the estate have their bright cream paint unblemished. Officials are puzzled. Borough surveyor J. Y. Hughes states it is attributed to atmospheric impurities, particularly sulphuretted hydrogen, which is thought to react with paint to produce lead sulphide. This atmospheric impurity, he considers, is peculiar to this particular part of Warrington. The gasworks and a number of factories are nearby. The Deputy Mayor (Councillor J. Morris) who is chairman of the Housing Committee, commented that the matter had been referred to the Ministry; the houses were put up to specification. There was a complete absence of damp in the steel houses.

NEXT WEEK'S EVENTS

MONDAY, DECEMBER 15

Royal Institute of Chemistry (London and S.E. Counties Section). Norwood Technical Institute, Knight's Hill, S.W.27, 7 p.m. Microchemical Exhibition and Demonstration.

Society of Chemical Industry (Manchester Section and Institution of the Rubber Industry). Engineers' Club, 17, Albert Square, Manchester, 6.15 p.m. D. A. Harper: "The Technology of Some New Condensation Rubbers."

TUESDAY, DECEMBER 16

Society of Chemical Industry (Chemical Engineering Group). Geological Society, Burlington House, Piccadilly, W.1, 5.30 p.m. J. G. Window: "Glass Equipment in the Chemical Engineering Industries." Plastics Group and London Section of Institution of the Rubber Industry. York Room, Caxton Hall, S.W.1, 6.30 p.m. D. V. N. Hardy: "Terylene and its Early Development."

Textile Institute (Lancashire Section). Manchester, 7 p.m. L. L. Preston and A. N. Thomas: "Radio Frequency Heating and Infra-Red Drying."

Society of Dyers and Colourists (Scottish Section). Royal Technical College, Glasgow, 7 p.m. Dr. C. H. Giles: "Modern Methods of Calorimetric Analysis."

WEDNESDAY, DECEMBER 17

Chemical Society. The Royal Institution, Albemarle Street, W.1, 5 p.m. J. Read: "Chemical Personalities a Century Ago."

Institution of the Rubber Industry (Southern Section). The Polygon Hotel, Southampton, 7.30 p.m. S. B. Turner: "Expanded Plastics."

North-Western Fuel Luncheon Club. The Engineers' Club, Albert Square, Manchester, 12 noon. Lord Woolton: "Matters of the Moment."

THURSDAY, DECEMBER 18

Chemical Society. Burlington House, Piccadilly, W.1, 7.30 p.m. Discussion on Infra-Red Spectra and Molecular Structure.

American Chemical Notebook

From Our New York Correspondent

NOTICES have been sent to members of the U.S. plastics industry by E.I. du Pont de Nemours & Co., Inc., announcing lower prices for polythene plastic. This is the fifth price reduction in polythene made by Du Pont since its manufacture was started in 1943. For uncompounded moulding powder without colouring or for powder compounded in standard colours, the reduction is four cents a lb. Previous prices were 50 cents a lb. for the uncoloured powder and 56 cents for coloured material. For polythene specially compounded or in non-standard colours, a different price schedule applies, and reductions range from four to seven cents a lb. Polythene was used extensively during World War II as an electrical insulator in aircraft and since then has been employed increasingly in household articles and the electrical and packaging industries.

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The Manufacturing Chemists' Association of the United States has announced publication of chemical safety data sheet SD-17 on aniline, the seventeenth of a series of chemical product safety manuals. It is designed for use by supervisory staffs and management, and outlines in addition to important physical and chemical properties of analine, methods for safe handling, shipping and storage. Copies may be obtained at 20 cents per copy from the Manufacturing Chemists' Association, 608 Woodward Building, Washington 5, D.C.

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According to Prof. Charles E. Waring, head of the chemistry department in the University of Connecticut, knockless gasoline can be made by selecting the right portions of petroleum. Recent investigations on octanes has disclosed that some cause knocking while others do not, depending on the way the atoms are arranged. When an octane is burned in the cylinder of an automobile many series of chain reactions course through the liquid. As a molecule explodes and releases energy, it is converted into a "hot" fragment, which in turn explodes a neighbouring molecule. The chain is broken only when two hot fragments collide or when a fragment strikes the wall of the cylinder. When all the carbon atoms in an octane molecule are arranged in a straight line, it has been found that the chain reactions are of varying durations, stated Prof. Waring, and the power to the cylinder comes in spurts, causing knocks. On the other hand, when the octane is branched, the chain reactions are relatively short and of approximately the same duration, and give a smooth flow of power. Anti-knock compounds, such as tetraethyl lead, which are added to almost all motor fuel, owe their effectiveness to the fact that they smooth out chain reactions in gasoline, he asserted. The investigations of octane burning were facilitated by the discovery that nitric oxide gas, added in small quantities to the fuel, would slow the reaction so that it could be observed, and combines with and inactivates some of the hot fragments.

* * *

A new product, called hydroabietyl, a new low-cost resin alcohol made from rosin, which has potential applications in a wide number of industries including textile, rubber, adhesive, detergent, paint, varnish, and lacquer, is now in commercial production according to the Hercules Powder company, Wilmington, Delaware. Hydroabietyl alcohol is the first commercially available primary alcohol to be developed from rosin. It represents the latest in a long series of chemical products developed by Hercules in more than 25 years of research in rosin chemistry. The new alcohol is a colourless, viscous liquid at room temperature, and is tacky, and not miscible with water, in contrast to more commonly used alcohols. Of all rosin derivatives, it is the most resistant to discoloration and degradation by light or air. The similarity of the properties of hydroabietyl alcohol to the properties of other high-molecular-weight alcohols, and the facts that it is resinous in nature and low in cost, indicate a wide variety of industrial applications. Like other high-molecular-weight alcohols, it is subject to esterification (with both organic and inorganic acids) and etherification. It is miscible with alcohols, ketones, esters, ethers, hydrocarbons, and chlorinated hydrocarbons, and is compatible with many film-formers and resins used in protective coatings and other products. It can be used without further chemical reaction as a modifier for chlorinated rubber, polyamides, hydrogenated oils, textile sizes, rubber compositions, and essential oil vehicles. Commercial production will be carried out in a unit of Hercules' new $3 million plant at Burlington, New Jersey, which was designed especially for the production of chemicals derived from rosin.

U.S. Extends Steel Export Control.—The U.S. Department of Commerce announces that as from January 1, 1948, export controls will be extended to cover 36 additional iron and steel products.

Chemical Plan for India

Scope for Fertilisers, Drugs and Dyestuffs Production

From a Special Correspondent

PRESIDING over the recent eighth annual general meeting at Madras of the Indian Chemical Manufacturers' Association, Dr. K. A. Hamied observed that besides their work as manufacturers, it must be their essential duty to devote their energies for the promotion of peace and harmony in the country. The session was inaugurated by Mr. H. Sitarama Reddy, Minister for Industries and Labour, who said that the chemical industry was of supreme importance to India's national economy. It was therefore a matter for regret that the progress of chemical manufacture had not made more rapid strides. Madras in particular was a most backward province in this industry.

There was scope for the starting of factories for fertilisers in Madras Province, particularly for the manufacture of superphosphates. It was not that Madras was poor in raw materials. For instance, there were the famous phosphatic nodules in the Trichinopoly area. They were rich in high-grade limestones and sulphur was likely to be found in the Kistna district. Referring to drugs and pharmaceuticals, the Minister stated that he had no doubt that under proper supervision and control, Indian manufacturers would be fully capable of competing in the world market in the production of even the most intricate drugs and pharmaceutical products. He also emphasised the need for the development of dyestuffs manufacture in India. Imports having been restricted, there was great need to develop this industry. He assured them that any representations made to the Madras Government would receive sympathetic consideration.

Superphosphate Industry

Delivering his presidential address, Dr. Hamied referred to the present position of the chemical industry and made certain suggestions for its future development. He also stated that the Government should place a ban on the export of bones, and organise the superphosphate industry not only from bone supplies of India but also from rock phosphates available in India and the neighbouring countries. He referred to the importance of establishing large plants for the production of sulphuric acid, and urged for the revision of the Government's import policy.

There was a need for home-produced coal-tar derivatives, as well as chemical plant, and laboratory apparatus for research; the glass and packing industry, and cellophane and box board manufacture should be developed. More transport facilities, lower freight rates, a uniform excise policy, the establishment of a National Institute for Drugs Research and for well-trained research personnel to handle the work were other matters touched upon by Dr. Hamied.

On the question of nationalisation of industries he said that democracy was inconsistent with State control, which removed healthy competition and resulted in waste and inefficiency. Nine resolutions relating to the development of the chemical industry, transport difficulties, excise policy, import and supply of raw materials, etc., were approved. One such resolution urged the Government to remove high taxation, the atmosphere of suspense about nationalisation, inadequate supplies of raw materials, high cost of fuel, lack of abundant and cheap electric power, lack of financial assistance, inefficiency in the working of controls, etc.

Atomic Research in India

In an attempt to develop and harness atomic energy to industrial and medical uses, the Government is pushing forward its plans for setting up research organisations at suitable places in the country. Three atomic laboratories have already been established—one in Bombay and two in Calcutta. According to present plans, the Tata Institute of Fundamental Research in Bombay will become the nation's biggest atomic research centre.

Dr. H. J. Bhabha, president of the newly-formed Board of Atomic Research in India, and Professor R. N. Saha, are touring the United States and Europe with a view to studying the progress of atomic research in the West. On behalf of India, Dr. Bhabha will negotiate the purchase of key atomic research plant and equipment in America. A joint committee for research has been set up for the purification and scientific utilisation of thorium found in Travancore, South India.

Key Material—Petroleum

Sufficient synthetic rubber to meet the needs of the entire world could be made from one-half of 1 per cent of the world's petroleum production. Dr. H. G. Burks, general manager of East Coast Manufacturing operations of the Standard Oil Company of New Jersey, estimates that less than 1 per cent of the current oil output, estimated at 8,000,000 barrels a day, would supply the world's alcohol requirements.

PARLIAMENTARY TOPICS

1851 Exhibition Centenary.—The Government has considered the possibility of marking the Centenary of the Great Exhibition of 1851 by some national display in addition to the British Industries Fair. Since under the revised investment programme, no new construction work can be undertaken for 1951, and it is not thought right on that account to abandon the centenary celebrations, it is proposed to have a national display illustrating the British contribution to civilisation—past, present and future—in the arts, science and technology, and in industrial design. In 1951, therefore, in addition to a Festival of Arts, there will be two major national exhibitions—one a first-rate design display to be sponsored by the Council of Industrial Design, and the other devoted to British achievements in science and technology to be organised by the Central Office of Information on behalf of the Research Councils and other scientific bodies.—Mr. Herbert Morrison.

Industrial Injuries Council.—An Industrial Injuries Advisory Council has now been appointed to advise the Minister of National Insurance on questions related to the National Insurance (Industrial Injuries) Act, 1946. Membership is as follows: Sir Wilfrid Garrett (chairman), Messrs. J. R. Allan, J. Bradshaw, E. De'Ath, E. C. Happold, Professor R. E. Lane, Messrs. Will Lawther, T. A. E. Layborn, D. B. Lewis, Miss Anne Loughlin, Messrs. John Megaw, H. W. Naish, E. A. Nicholl, Alfred Roberts, Clifford C. Trollope, Frank Wolstencroft, and one other.—Mr. J. Griffiths.

River Boards' Bill.—In the House of Lords on Tuesday, the Duke of Devonshire moved an amendment to make it obligatory on the Minister of Agriculture to consult the interests concerned before setting out the areas of the boards. In a reply opposing the amendment, the Earl of Huntingdon said that the business of drawing up the areas was extremely complicated, and would in some cases be extremely controversial. There would, however, be full consultations with the affected bodies. He added that the amendment would be considered again before the Report stage.

Coal/Oil Conversion Figures.—As a result of the conversion from coal to oil by industry and the railways since May, 1946, about 1,100,000 more tons of oil have been consumed.—Mr. H. T. Gaitskell.

Coal Target—Shortage Estimated.—Total coal production for the year ended December 27 is expected to approximate 196 million ton, *i.e.*, 4 million tons short of the Coal Board's target of 200 millions.—Mr. H. T. Gaitskell.

Polish Coal.—During the five months ended November 30 imports of Polish coal amounted to 80,000 tons.—Mr. H. Gaitskell.

Advertising Tax Dropped.—Sir Stafford Cripps during the debate in committee of the Finance Bill announced his willingness to accede to the representations he had received from industry in opposition to Clause 9 (taxation of advertising expenditure). In the circumstances, said the Chancellor of the Exchequer, he was prepared to try the voluntary method of limitation of advertising expenditure recommended by the Federation of British Industries, and to withdraw this clause. He hoped there would be success in the efforts being made. They would have an opportunity to consider the matter in April next to see what progress they had been able to make.

CLEANER AND CHEAPER COAL

BY the end of 1948 the National Coal Board is to instal from 30 to 45 large new plants to raise the present percentage of washed coal from 48 to 67. Each will deal with a group of pits. One of these plants alone will cost between £800,000 and £1 million.

Mr. H. S. Haslam, Rotherham, Midlands Area general manager, said recently in Nottingham: "We will wash over 850 tons of coal an hour, and there is only one other such machine in the world which is bigger. That is somewhere in China.

"Next year we are hoping to establish a new national and rational price structure, under which we shall take no money at all for stones," said Professor Douglas Hay, the Board's chief mining engineer. "This would penalise the producer and not the buyer for dirty coal."

DUTCH MORPHIA

WHEN the import of opium was forbidden in Holland during the war, the shortage of morphia and codein made the extraction of opium from husks of maw seed necessary. The Dutch Pharmaceutical Co., of Bonnema and Zwitsal, has, in conjunction with the experimental laboratory of Wageningen, succeeded in the making of alkaloids on a large scale from this seed which is being grown on an increasing scale in Holland. The company claims that by improved extraction processes the home output of morphia and codein can shortly meet the whole Dutch demand and there will be a surplus for export. Another large-scale factory for morphia making and kindred pharmaceuticals will be put up at Appeldoorn under the style of United Pharmaceutical Plants, Ltd.

A CHEMIST'S BOOKSHELF

British International Plastics Annual, 1947. Edited by Lionel G. Hill. London: Croome Hill International Ltd., London. Pp. 457. Price 3 gns.

The editor of this volume is to be congratulated on producing a really useful reference book, and not just another book on plastics. The word "plastics" has come to mean a material which is plastic at some stage of its manufacture and can be formed by the application of heat and pressure, and by popular consent it excludes ceramics, glass, rubber and cement. Mr. Hill uses practically throughout this volume the word "Plasthetics" (derivation: Plastics, Synthetic) for synthetic plastics. The word plasthetics is not euphonious but there is a need for such a word term, so that perhaps it has come to stay. An innovation is the mention of the specifications of the American Society of Testing Materials as well as those of the British Standards Institution. American Federal specifications are quoted where relevant but nowhere can there be found a reference to the specifications of the British Government, *e.g.*, those issued by the Ministry of Supply. Rather inexplicably, little information is given on the chemistry of aniline formaldehyde resins. A flow sheet is given for the manufacture of butadiene but no mention is made of Reppe's synthesis of butadiene via 1 : 4 butinediol from acetylene and its advantages over the method described. It is rather surprising in a book of this scope that Reppe's work is not mentioned. Of special interest are the references to the possibility of vulcanising PVC in a similar manner to rubber. As no mention is made of Hycar it is inferred that PVC can form a vulcanisate in the absence of a vulcanisable synthetic rubber such as Hycar. There are, inevitably, one or two errors, such as the spelling of amine on p. 141, and Mr. P. J. Smith, author of the section on the chemistry of synthetic plastics, does not appear to be aware that the Sap Value is the sum of the acid value plus ester value. (His definition: saponification number is a measure of the amount of ester present.) His saponification number is, of course, the definition of ester value. The Notes on Physical Tests provides valuable information not readily found in books on plastics. The index at the back of the volume is not explicit. The closely printed list of "Properties of Commercial Plastics" and the details on plasticisers are invaluable and are of use to chemist, buyer, and salesman alike. The list of societies and trade associations is similarly useful as it contains a resumé of the functions of each. Among the list of fillers, mention should be made of nylon as from the patent details it would appear that this filler will have an important future. The editor evidently welcomes adverse comments and his inclusion of a questionnaire to readers on the value of the various sections is to be applauded; it should ensure that the next volume will be of even greater value.

Plastics Manual by H. R. Fleck. London: The English Universities Press, Ltd. 1947. Pp. XXVIII-155. 15s. net.

The author, an authority in the field of plastics, continues with this book in logical sequel the series, of which the preceding three volumes were "Plastics-Scientific and technological" (THE CHEMICAL AGE, p. 216), 1946), "The Story of Plastics" (C.A., p. 680, 1946), and "The Theory of Polymerisation" (C.A., p. 722, 1946). The present book is a practical reference for both producers and consumers of plastic materials; its purpose, to make available in manual form as much information as possible on the various substances used by the plastic industry, is unusually fully achieved. As far as possible, all information relating to a particular plastic material is localised in one section, so that data are readily available. The book is divided into 18 chapters, dealing with general progress in the plastic industry, its raw materials, and the miscellaneous kinds—*e.g.*, with acrylic, allyl, amino, phenol and other resins, followed by cellulose, poly-ethyene, poly-styrene, and vinyl plastics. The next chapters study synthetic cements and resins, densified wood and fillers. One chapter is devoted to the qualitative analysis of plastics, definition of some terms and to moulds and mechanical methods used by the plastic industry for fabricating the final products. The last are divided into two groups: those using thermosetting resins, and those using thermoplastic resins, although some overlapping is often unavoidable. The manual is provided with many figures and 33 tables, and with a detailed index which indicates the large scope of the work.

Home News Items

Coal for Tasmania.—A 4000-ton cargo of Welsh anthracite coal left Swansea this week for Hobart, Tasmania, where it is to be used for the manufacture of carbide.

Next Year's Coal Target.—Mr. Hugh Gaitskell, speaking at Cinderford, Forest of Dean, last week-end, said that the coal target for 1948 is to be 214 million tons, a 7 per cent increase over this year's figure. It was hoped to be able to export 10 millions.

Wrexham Coal Prospecting.—The first of a series of deep bore-holes has now been completed by National Coal Board contractors at Whitegate, Wrexham. The whole range of coal seams appears to be "very satisfactory," it is officially stated. A further three bore-holes will be sunk in an area of two or three square miles before the investigation for coal can be regarded as complete.

Aluminium Trawler Construction.—A new use for aluminium is in the construction of trawlers, the first of which will shortly be launched from a yard at Lowestoft. With a superstructure of aluminium alloy, it is expected that the vessel will be capable of increased speeds. The magnetic compass will be less subject to interference from the alloys, which are expected to show high corrosion resistance to sea-water.

Shell Development Projects.—Sir Frederick Godber, chairman of the Shell companies, whose development programme includes the erection of two complete refineries in this country—one probably at Stanlow, Ellesmere Port, to deal with oil from the Middle East, told shareholders last week that no one would expect that the large sums they were contemplating that day (the resolution increased the capital to £53 million) would be the end of their development needs.

Engineers Under New Control.—Crofts (Engineers), Ltd., Empire Works, Thornbury, Bradford, has purchased the whole of the assets of Newton, Bean & Mitchell, Dudley Hill, Bradford, which was established over 50 years ago (1896) and has specialised in the manufacture and repair of steam engines, condensing plant, compressors, power transmission accessories, etc. The business will be carried on under the same name without interruption and with the same employees and management. The purchasers intend, after a complete reorganisation and re-equipment of the works, to move certain of their manufactures to Dudley Hill.

New Offices.—The new address of the Purchasing Officers' Association (as from December 20) is 17-18 Henrietta Street, London, W.C.2. (TEMple Bar 3011.)

Christmas Posting.—The Post Office has drawn attention to the necessity to post not later than December 18 all parcels to be delivered by Christmas Day. The latest date for letter packets, letters and cards is December 20.

Johnson Matthey Dramatic Society.—Members of the Johnson Matthey Dramatic Society gave a performance of "Love From A Stranger"—a three-act thriller—at King George's Hall, W.C.1, on Thursday, Friday and Saturday last week. Large audiences applauded the accomplished acting of Miss Carol Webb and Mr. Frank Braby.

Housing Key Workers.—Two houses have been bought by the Triplex Safety Glass Co., Ltd., at Stone, Staffs, to accommodate employees at the factory of their subsidiary company Quickfit and Quartz, Ltd., manufacturers of laboratory glassware. It has been found necessary to bring several key-men from the King's Norton works.

B.O.T. Storage to End.—The Board of Trade Storage Control is to terminate on December 31. Set up in 1941 to co-ordinate the demands for storage space of various Government departments, the Control requisitioned more than 170 million sq. ft. of space. By October 31 last, about 163 million sq. ft. had been released for civilian production, and the remainder will have been returned by the end of the year.

Atomic Physics Film.—Atomic physics is the subject of an instructional film just completed by the Gaumont-British company. Collaborators have been Dr. Cockcroft and Prof. Trisch, the Atomic Scientists' Association, the Royal Society, the Royal Institution, Cavendish Laboratory, Science Museum, and the Imperial College. The film, which consists of five sections, shows sequences in which the late Lord Rutherford, and the late Sir Joseph Thomson took part.

Scottish Plating Plant.—The new electroplating plant, one of the largest in the country, recently opened at Ancrum Works, Lochee, Dundee, by North British Electro-Plating Co., Ltd., is expected to have a weekly output of some 16,000 sq. ft. of chrome and nickel products and will develop alternative types of finishing. The development is being sponsored by Mr. C. T. A. Shearer, who has had considerable experience with metal working plants in England.

Personal

DR. F. E. KING has been appointed to the Sir Jesse Boot Chair of Chemistry at the University of Nottingham.

MR. G. F. WILLIAMS has been appointed managing director of British Drug Houses in succession to MR. F. C. OSCAR SHAW.

MR. R. C. WEBB, manager of the Dunlop Rubber Company's Far East division, has left London by air for a three months' tour of Batavia, Hong Kong, Shanghai and Manila.

MR. A. S. BISHOP, a director of the Goodyear Tyre and Rubber Co. (Great Britain), Ltd., has been elected chairman of the Tyre Trade Joint Committee in succession to the late SIR HAROLD KENWARD.

SIR IAN HEILBRON, director, chemical laboratories, London University, will be the first Reilly lecturer in chemistry at Notre Dame University, Indiana, when he visits that city during April and May next year.

Evans Medical Supplies, Ltd., Speke, announce that MR. H. ASHLEY MASON has been appointed overseas trade director, and MR. W. A. KINNEAR, home sales director. Both joined the firm early last year, Mr. Kinnear became chief drug buyer last September.

DR. C. E. SAGE, of Fortis Green, London, N.W.2, and MR. A. W. COWBURN, of W. H. Cowburn & Cowpar, Ltd., Manchester, have been congratulated by the president of the Society of Chemical Industry upon completing 50 years' membership of the society.

MR. W. S. ROBINSON has retired from the boards of Broken Hill—the Australian iron and steel group—and the Zinc Corporation. It is expected he will be appointed president of both groups in recognition of his services, without taking full executive responsibility.

MR. STANLEY J. DYAL has been appointed a director of Thos. W. Ward, Ltd. He has been the company's chief valuer for many years, has travelled abroad extensively and in 1940 flew the Atlantic to deal with affairs connected with the sunken German battleship *Graf Spee*.

PROF. J. A. SCOTT WATSON has been appointed chief scientific and agricultural adviser to the Ministry of Agriculture, and director-general of the national agricultural advisory service—with effect from January 1, 1948. The appointment is consequent upon the resignation of Sir William Garvin who vacates the post on December 31.

Obituary

A private memorial service to MR. SAMUEL COURTAULD, who died last week, was held at St. Marylebone Parish Church on Tuesday last.

The death occurred recently of MR. JOHN RUNDLE PRYNN, Hartley, Plymouth; he was 66. Due to retire at the end of this year from his work in the explosives department of the Imperial Chemical Industries, Ltd., Mr. Prynn had been an executive in Plymouth since 1900 and on two occasions had received presentations for his service. He was well known throughout Devon and Cornwall as a Methodist local preacher.

MR. D. R. LAWSON, who since 1943 has been a director of Imperial Chemical Industries, Ltd., and responsible for the activities of the heavy chemicals group of the company, died in London on Sunday last at the age of 53. Born at York, he was educated at Harrow and University College, Oxford. His business career commenced in 1920 when he joined the Brunner Mond Company; in 1943 he was appointed to the board of I.C.I. In 1931 he was appointed a member of the Central Administration Committee, and chairman of the delegate board of the Buxton Lime Firms Co., Ltd.—later I.C.I. (Lime), Ltd. In 1939 he became chairman of the delegate board of I.C.I. (Alkali), Ltd., and in 1941-42 was appointed to the delegate boards of I.C.I. (Salt), Ltd., and I.C.I. (General Chemicals), Ltd.

The late Mr. D. R. Lawson

New Chemical Insecticide.—An American chemical company is reported to have produced a new chemical insecticide, identified as Thiophos 3422, which is claimed to be more effective than DDT, and to have no deleterious effects upon farm produce.

Overseas News Items

Swedish Ore for Ruhr.—The first cargo of Swedish iron ore, intended for the Ruhr, has recently arrived in Rotterdam.

Italy to Ship Chemicals to Jugoslavia.—Under a special protocol, forming part of the recently signed Italo-Jugoslav trade treaty, Italy will ship considerable quantities of chemicals to Jugoslavia which, in return, will send ores and industrial raw materials.

International Chemists' Committee.—The creation by the American Chemical Society of a new standing committee on international relations under the chairmanship of Prof. L. P. Hammett, Columbia University, is announced by Dr. W. Albert Noyes, Jr., president of the Society and chairman of the department of chemistry in the University of Rochester.

Prospecting in the Cameroons. — A Colonial Office announcement states that a company with an initial capital of £60,000 is to be formed to undertake prospecting for minerals in the Cameroons. Interested are the Nigerian Government and the London Tin Corporation, the former being responsible for the appointment of a chairman and half of the other directors.

New Scientific Journal.—The first issue of *Applied Mechanics Review*, a new monthly engineering and scientific journal devoted to current world-wide literature in the field of applied mechanics, will appear in January, 1948, the American Society of Mechanical Engineers announced last week. Co-sponsors of the magazine are the A.S.M.E., the Engineering Foundation, the Illinois Institute of Technology and other organisations. The business address of the magazine will be 29 West 39 Street, New York.

More Canadian Plastics Plant.—Notable additions to its manufacturing capacity of resins and plastics are being made by the Canadian Resins & Chemicals, Ltd., at its plants at Shawinigan Falls, Quebec, Canada. An addition to the firm's resin plant which is now nearing completion will add approximately 50 per cent to present productive capacity. The company is constructing a new plant for the production of plasticiser for use in the compounding and fabricating of plastic film and sheeting. In conformity with modern practice, much equipment will be located outside the building, including an elaborate tank area for storage of both raw materials and finished products. The plant should be in operation early next year.

Penicillin Plant for Slovakia.—A plant for the manufacture of penicillin as well as of certain other pharmaceutical products is to be set up in Humenne, Slovakia.

Swedish Uranium.—Nine tons of uranium are to be produced annually in Sweden from radioactive slate if plans, still in the laboratory stage, prove to be practicable.

Belgian Chemical Exposition.—Regulations under which the international exposition of pure and applied chemistry will be held at Charleroi (September 4-20, 1948) and registration forms for industrial undertakings wishing to participate in the Belgian exhibition are being circulated this week by the Secretariat General de l'Exposition, 3 Rue de la Fenderie, Charleroi.

Egypt's Fertiliser Production Plans.—A new company is to be established in Egypt with a capital of £E4 million to build a fertiliser plant to produce annually about 200,000 tons. Production is scheduled to start at the beginning of 1950. The necessary equipment, etc., is to be purchased partly in this country, partly in the United States.

Rising European Coal Figures.—Widespread improvement in European coal output was recorded in October. The total increase of the reporting countries was more than 1.6 million metric tons. The individual figures, with comparisons with the totals for September (in parentheses) in metric tons were: Ruhr and Aachen 6,658,000 (6,263,000); Saar 1,025,000 (953,000); Poland 5,760,000 (5,367,000); France 4,621,000 (3,982,000); Belgium 2,130,000 (2,006,000); Holland 922,000 (898,000). France reached 119 and Poland 113 per cent of the average pre-war output.

Ammonium Sulphate Plant for Travancore.—Travancore has given a lead to the rest of India by the installation of a 50,000-ton plant at Alwaye, on the bank of the River Periyar, for the manufacture of ammonium sulphate. A sulphuric acid plant is also being installed, and both are expected to commence production shortly. Fertilisers & Chemicals, Travancore, Ltd., has been floated with an authorised capital of £3,750,000, and the present issue is £1,500,000, of which the Government of Travancore has been allotted £750,000, the Government of Cochin £47,500 and the Government of Madras £187,000. The remainder is being taken up by shareholders in Travancore, Mysore and Cochin. The fertiliser plant is expected to be one of the world's largest.

U.S.—Moroccan Enterprises

Big Mineral Development

THE subject of the October issue of *International Reference Service*—published by the U.S. Department of Commerce—is French Morocco, which is reviewed for the year 1946 from an economic standpoint. Quite incidentally, it emphasises the growing U.S. participation in Mediterranean trade, and the parts that U.S. Consuls are being called upon to play in that respect.

The review is based upon a report submitted by the U.S. Consulate General in French Morocco, and closely resembles that referred to in THE CHEMICAL AGE, December 6, p. 729, and dealing with Turkey.

U.S. Equipment

Output from Moroccan phosphate mines which in 1945 totalled 1,625,000 metric tons, rose in 1946 to 2,784,000 tons. This expansion, states *I.R.S.*, can be attributed to improved transport facilities, increased electric power, and the use of modern equipment obtained from the U.S. A new deposit discovered near Khouribga may yield an additional 3 million tons of phosphates per year; 70 per cent of all foreign exchange earned by French Morocco in 1946 was obtained from the export of phosphates which yielded a net profit of over a billion francs.

The Moroccan coal industry, too, achieved a better production in 1946 when output averaged 19,500 tons per month compared with 15,000 tons per month in 1945. Production of lead ore was greatly accelerated in 1946, and large stocks are being held at the mines awaiting completion of new smelting plants which may be ready before the end of this year. The lead mines, which are 49 per cent controlled by U.S. companies, are installing modern equipment.

France and her colonial possessions apart, 90 per cent of all imports reaching French Morocco in 1946 came from the U.S., their value being $52 million compared with only $4.8 million in 1938.

PAPER PULP SHORTAGE

ADDRESSING the 55th annual general meeting of Thos. Owen & Co., Ltd., at Cardiff last week, Mr. William Harrison, chairman, said that there was a grave scarcity of pulp in the Scandinavian countries from whom the British paper industry had in the past largely drawn its supplies. He was discussing the difficulties the company was experiencing in obtaining delivery of imported plant that ought to have arrived in the autumn of 1946. This plant was required for the production of pulp from straw, and when delivered would do much to save the importation of foreign pulp.

Technical Publications

New F.B.I. Guide

The first post-war edition of the F.B.I. Register of Manufacturers—the only complete guide to the members of the Federation of British Industries, their products and services—is now available. Published jointly by Kelly's Directories, Ltd., 186 Strand, London, W.C., and Iliffe & Sons, Ltd., the 1947-8 edition lists over 5000 of the foremostt manufacturing organisations in Great Britain, and includes much new information designed to appeal specifically to foreign buyers. The price to non-members is 2 gns.

* * *

Of special value to pharmacists studying for the diploma in biochemical analysis is the compilation in booklet form by the Pharmaceutical Press of the studies by Mr. T. D. Whittet, chief pharmacist, University College Hospital, London, of the character and uses of diagnostic agents originally published in April and May this year in the *Pharmaceutical Journal*. The diagnostic tests described make "Diagnostic Agents" (2s. 6d. net) a valuable work of reference for practitioners as well as students.

* * *

Industrial electric motors are ubiquitous and are indispensable items of equipment wherever they occur. But, since we are not all electrical engineers, there are many such power plants receiving less understanding treatment than is their due. Testifying to some of the gaps in knowledge of industrial electric motors and ancilliary equipment Higgs Motors, Ltd., of Witton, Birmingham, have produced "Industrial Electric Motors" (1s. net) a booklet in small diary format which seems to provide all the answers to questions of specifications, performance, maintenance and the identification of faults of all the basic types of equipment

* * *

Storage of Cottonseed and Peanuts under Conditions which Minimise Changes in Chemical Composition, published by the U.S. Department of Agriculture, Washington, D.C., of which advance copies have now reached this country derives a special interest from the continuing shortage of industrial vegetable oils and the need for their utmost conservation.

* * *

Ministry of Supply specifications for aluminium alloy bars, extruded sections and forgings, are laid down in the newly reprinted Specification 682, incorporating amendment lists Nos. 1 and 2 (H.M.S.O., 1s. 1d. post paid).

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH MALAY RUBBER CO., LTD., London, E.C. (M., 13/12/47.) November 10, charge to Industrial Rehabilitation (Finance) Board, Kuala Lumpur, securing all sums which the chargee may be called upon to pay under a guarantee; charged on certain land. *Nil. August 6, 1947.

Company News

Crystallate, Ltd., manufacturers of plastic mouldings, have recommended a 7½ per cent dividend, less tax, on its ordinary share capital for the year ended September 30 (1946, 6 per cent).

A. Boake, Roberts & Co., Ltd., has taken powers to increase their preference share capital by £200,000 (of which £150,000 is now being issued) and their ordinary share capital by £37,500.

Aspro Ltd. announces a net profit of £593,557 for the year ended June 30, 1947, an increase of £170,000 on the previous year. A final dividend of 35 per cent is recommended on the ordinary stock, making 50 per cent for the year (1946, 35 per cent).

New Companies Registered

Canon (Chemicals), Ltd. (445,810).—Private company. Capital £1000. Manufacturers of and dealers in metals, chemicals, gases, drugs, medicines, etc. Subscribers: H. F. Bowman and Rosa Bowman. H. F. Bowman is the first director. Reg. office: 51 Hamilton Gardens, N.W.8.

Stelloid Products, Ltd. (445,021).—Private company. Capital £2000. Manufacturers, exporters and importers of and dealers in plastic materials, synthetic products, cellophane, rayon, nylon, fibres and fibre goods, etc., manufacturing chemists, trunk, box, case, furniture and bedding manufacturers, etc. Subscribers: Wm. G. Hackett and R. McKinnon. Secretary: H. W. Watterson, Bedmont House, Markfield Lane, Newtown Linford, near Leicester.

Enterprises (Congleton), Ltd. (445,702).—Private company. Capital £2000. Manufacturers and dealers in chemicals, fine chemicals and chemical products, etc. Directors: N. Davis, R. J. B. Bradbury and A. E. Bradbury. Reg. office: 62 Chestergate, Macclesfield, Cheshire.

Francis Rigby, Ltd. (445,827).—Private company. Capital £3000. Manufacturers of and dealers in bronze, aluminium and other metallic powders and inks, cellulose and other paints, etc. Directors: F. E. Rigby and M. E. Rigby. Secretary: F. E. Rigby. Reg. office: 173 Tamworth Road, Sutton Coldfield.

Arden Industrials, Ltd. (445,861).—Private company. Capital £1000. Importers, exporters and manufacturers of articles made from latex, rubber, plastic or other chemical compound (other than medicines), etc. Subscribers: B. R. Morris and G. E. Mawer. Secretary: A. W. Hopkins. Reg. office: 34 St. Peter's Street, St. Albans.

Amplex Appliances (Kent), Ltd. (445,205). Private company. Capital £500. Manufacturers of and dealers in plastic, metal, carborundum, wood, glass or similar materials, scientific instruments and apparatus, compasses, binoculars, cameras, etc. Directors: Noel H. Pickering, and Mrs. Olive Dickinson. Registered office: 19 Dartmouth Road, Hayes, Bromley, Kent.

Charles J. Quirk and Co., Ltd. (445,691).—Private company. Capital £10,000. Dealers in and distributors and manufacturers of carbides, cyanamides, nitrogen, nitric and sulphuric acid, ammonia, sulphate and nitric of ammonia, sulphur and chemicals of all kinds, etc. Directors: F. W. Summerfield, G. C. A. Summerfield and D. W. Summerfield. Reg. office: 55 Gordon Square, W.C.1.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets failed to increase, although firmness prevailed in most sections, and British Funds rallied moderately and home rails approximated more to their "take-over" levels. The rate of interest of the huge amount of British Transport stock, which is to be issued in exchange for home rails, is not expected to be announced until after Stock Exchange hours on January 1. Industrial shares recorded moderate gains, although hopes of response to the U.S. loan decision were not borne out, other international political developments being a dominating factor.

Shares of chemical and allied companies were among those coming in for more attention on export trade expansion hopes. Fisons were favoured up to 69s., Monsanto

Chemicals 5s. ordinary rose to 63s. 1½d., and A Boake Roberts' new shares were 7½d. premium. Imperial Chemical changed hands actively around 50s. 6d., Glaxo Laboratories remained firm at £22 in response to current dividend estimates, B. Laporte were 83s. 9d., and W. J. Bush 82s& 6d. Among smaller-priced shares, Lawes Chemical 10s. ordinary were 14s., and Major & Co.'s 2s. shares strengthened to 3s. 6d. United Molasses were 51s. 6d., with the units of the Distillers Co. at 29s. 6d., but British Oxygen eased to 99s. 4½d., although Borax Consolidated (53s. 9d.), and British Aluminium 50s. 3d.) remained influenced by higher dividend hopes.

Turner & Newall, following the higher profits and raising of the dividend from 12½ per cent to 15 per cent, were 82s. 10½d., at which the yield is rather more than 3½ per cent based on the higher payment, the latter being well below the actual rate of earnings on the shares. Paint shares again reflected higher dividend hopes and talk of better linseed oil supplies. Lewis Berger were £9⅛, with Pinchin Johnson 59s. 9d. (the new issue of shares to shareholders is expected early in 1948), International Paint £6¾, and Goodlass Wall 10s. ordinary 40s. 9d.

In other directions, Allied Iron rallied to 56s., Babcock & Wilcox (75s.) showed firmness again, but elsewhere, General Refractories turned easier at 23s. 1½d., and Lever & Unilever lost a few pence at 53s. 9d. De La Rue at 53s. 9d. have been firmer since declaration of the unchanged interim divident, Dorman Long at 27s. 3d. kept firm on further consideration of the results, Colvilles were 28s., yielding nearly 5⅛ per cent, while at 26s. 6d. the yield on United Steel is not far short of 6 per cent.

The return on most iron and steel shares is quite attractive, and there are considered in the market to be very good prospects of dividends being maintained, bearing in mind the excellent rise in steel output. Moreover, there is general confidence that in any case nationalisation will not be brought in until 1949, and that on any fair basis of compensation, most iron and steel shares must be regarded as moderately valued at to-day's market prices.

Tube Investments touched £7¼ in view of the good impression created by the full results and consolidated accounts. Head Wrightson at 50s. 9d. were among shares of companies making oil refinery equipment to attract more attention.

Boots Drug were 60s. 3d., Beechams deferred (22s.) have been firm, while the new 4½ per cent preference touched 3s. premium. Aspro rallied to 43s. 1½d. following the statements at the meeting. Griffiths Hughes rallied to 38s. 9d. In other directions, Nairn & Greenwich moved up further to 83s. 9d. partly on hopes of consolidated accounts being issued next month. Oil shares were prominent with Shell changing hands up to 81s. 3d. prior to the commencement of dealings in the new shares which are expected to attract buying on a large scale. Anglo-Iranian, however, eased to £8, influenced by the Palestine situation.

British Chemical Prices

Market Reports

ACTIVE trading conditions have been reported on the London chemical market during the past week with the larger users giving increasing attention to contract replacement buying. Export trade continues steady and up to the full extent of available supplies. There have been no important price changes, but the undertone of the market is strong and an upward revision of quotations at the end of the year is regarded in some quarters as inevitable. The demand for the soda products is brisk and available quantities find a ready outlet. The price of soda crystals is being raised by 7s. 6d. per ton as from January 1 for quantities of 5 cwt and over. The potash chemicals continue firm, with supplies difficult to secure. Paint raw materials and textile chemicals are under pressure from users, while formaldehyde, acetone and the heavy acids remain in good call. There is nothing fresh to report in the coal-tar products market.

MANCHESTER.—Steady trading conditions have prevailed during the week on the Manchester chemical market. Replacement orders on home trade account for textile and other chemicals have covered fair quantities of the aggregate and additional business for shipment has embraced a fairly wide range of bread-and-butter lines. Steady deliveries of the general run of alkali products against existing commitments are being called for, and there is a full absorption of supplies of the potash chemicals. The ammonia and magnesia products are in steady request. Basic slag and lime are the most active sections of the fertiliser market; in other directions a moderate trade is passing. The tar products generally continue to meet with a good demand.

GLASGOW.—Business in the Scottish chemical market has been fairly active during the past week as a result of the inquiries for 1948 contracts. Actual demand for material for prompt supplies has been normal. In the export market conditions have been quieter, but there are indications that, with the signing of new trade agreements, there is potentially a large market.

Patents in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Complete Specifications Open to Public Inspection

Process for the production of synthetic drying oils.—Universal Oil Products Co. April 28, 1944. 21351/1947.

Method of determining the concentration of a given chemical constituent of a fluid.—Wallace & Tiernan Products, Inc. Feb. 27, 1946. 5109/1947.

Arrangement for facilitating the placing of sample tubes in the bowl of a butyrometer centrifuge.—A/B Separator. March 2, 1945. 33584/1946.

Production of coatings on aluminium and its alloys.—American Chemical Paint Co. March 9, 1946. 6700/1947.

Purification of N - [4 - ¦ - [(2-amino-4-hydroxy-6-pyrimido [4, 5-6] pyrazyl) methyl]-amino ¦ -benzoyl] glutamic acid.—American Cyanamid Co. Feb. 13, 1946. 32805/1946.

Phenol-aldehyde-amine condensation products.—Bakelite Corporation. Jan. 8, 1946. 82/47.

Alkali resistant phenol-formaldehyde resin.—Bakelite Corporation. March 13, 1946. 6817/1947.

Anthraquinone acid dyestuffs.—S. G. Bedekar, and Dr. K. Venkataraman. Feb. 26, 1946. 25409/1946.

Process for the preparation of 2 : 4 dichlcoro-1-aminoanthraquinone.—S. G. Bedekar, and Dr. K. Venkataraman. Feb. 26, 1946. 25410/1946.

Manufacture of new intermediate products and azo-dyestuffs.—Ciba, Ltd. March 8, 1946. 5575-77/1947.

Manufacture of asymmetrical disazo-dyestuffs.—Ciba, Ltd. March 8, 1946. 6434-35/1947.

Pyridazone derivatives and method preparing same.—General Aniline & Film Corporation. Sept. 14, 1945. 20115/1947.

Synthetic rubber like materials.—B. F. Goodrich Co. May 10, 1940. 23172/1947.

Method of coagulating synthetic rubber latices.—B. F. Goodrich Co. Nov. 11, 1942. 23173/1947.

Production of polmeric material.—B. F. Goodrich & Co. Feb. 19, 1941. 23305-6/1947.

Production of butadiene polymers and copolymers.—B. F. Goodrich & Co. Feb. 23, 1944. 23307-8/1947.

Synthetic rubber-like materials.—B. F. Goodrich & Co. Sept. 1, 1942. 23427/1947.

Polymerisation of unsaturated organic compounds.—B. F. Goodrich. Feb. 19, 1941. 23428/1947.

Polymerisation of dienes.—B. F. Goodrich Co. May 10, 1940. 23532/1947.

Production of synthetic rubber.—B. F. Goodrich Co. Oct. 23, 1940. 23533/1947.

Ceramic pigments.—Harshaw Chemical Co. Feb. 15, 1946. 32712/1946.

Production of highly-concentrated solutions of alkali hydroxide.—I.C.I., Ltd. March 9, 1946. 6626/1947.

Apparatus for the decomposition of alkali metal amalgams.—I.C.I., Ltd. March 8, 1946. 6627/1947.

Electrolytic cells.—I.C.I., Ltd. March 11, 1946. 6767/1947.

Manufacture of cellular materials from clays or similar silicates.—A. Frokjaer-Jenson. May 15, 1943. 23068/1947.

Individual multilayer fibrous resin-bearing article.—Keyes Fibre Co. May 14, 1941. 20748/1947.

Method of manufacturing resin-bearing fibrous pulp articles.—Keyes Fibre Co. May 6, 1943. 20749/1947.

Gasification of carbonaceaus materials.—K. Koller, and F. Esztergalij. Oct. 26, 1942. 23016/1947.

Method of purifying benzene.—Koppers Co., Inc. Jan. 6, 1941. 96990/1946.

Method of producing penicillin and culture medium therefor.—E. Lilley & Co. March 8, 1946. 1430-2/1947.

Process for the production of auxiliary agents for dyeing textile fibres.—Maison Cetesel. Feb. 25, 1946. 27835/1946.

Method for the preparation of N-methyl-1-glucosamine from arabinose.—Merck & Co., Inc. March 8, 1946. 4965/1947.

Insecticidal compositions.—Pennsylvania Salt Manufacturing Co. March 13, 1946. 6819/1947.

Refining of copper.—Revere Copper & Brass, Inc. Feb. 19, 1946. 18280/1946.

Chlorinated products.—Ridbo Laboratories, Inc. Aug. 19, 1943. 21586/1944.

Refining of mineral oils.—Standard Oil Development Co. March 15, 1941. 18923/1947.

Method of dyeing cellulose acetate and dye bath compositions.—Textron, Inc. March 12, 1946. 4313/1947.

Method of dyeing cellulose acetate and dye bath compositions.—Textron, Inc. March 12, 1946. 4314/1947.

Production of butadiene.—Universal Oil Products Co. Oct. 29, 1943. 22960/1947.

Separation of alumina values from phosphorus-contaminated bauxite material.—Aluminium Laboratories, Ltd. March 21, 1946. 6110/1947.

Process and apparatus for the electrolytic production of aluminium.—M. Barnabo. March 22, 1946. 7692-94/1947.

(*Continued on page* 778)

Manufacture of vat dyestuffs of the dibenzanthrone and isodibenzanthrone series.—Cincinnati Chemical Works Corporation. March 26, 1946. 8233-34/1947.

Manufacture of ultra-violet transmitting high silica glass.—Corning Glass Works. March 28, 1946. 7601/1947.

Manufacture of organo-siloxanes.—Corning Glass Works. Feb. 26, 1942. 21437/1947.

Processes for the production of amines and or imines.—E.I. Du Pont de Nemours & Co. July 15, 1944. 17935/1945.

Production of heterocyclic nitrogen compounds.—E.I. Du Pont de Nemours & Co. March 27, 1946. 7595/1947.

Artificial fibres.—E.I. Du Pont de Nemours & Co. March 22, 1946. 7794/1947.

Hydrogenation of mononuclear aromatic hydrocarbons.—E.I. Du Pont de Nemours & Co. March 25, 1946. 7982/1947.

Fabrication of polytetrafluorethylene articles.—E.I. Du Pont de Nemours & Co. March 29, 1946. 8450/1947.

2.8-Dihydroxynaphthalene - 6 - sulphonic acid as the azo component for diazotype prints.—General Aniline & Film Corporation. March 20, 1946. 2514/1947.

Process for preparing mercapto vinyl derivatives.—N.V. Gevaert Photo-Producten. March 22, 1946. 7808/1947.

Preparation of amides.—B. F. Goodrich Co. March 21, 1946. 7560-61/1947.

Metallo-sulpho-methylphenols. — Harvel Corporation. March 23, 1946. 20218-19/1947.

Manufacture of synthetic resins from phenols and aldehydes and of polyphenols therefor.—F. J. Hermann. March 29, 1946. 8670-71/1947.

Process for the manufacture of bromo-substituted imidazolones.—F. Hoffmann-La Roche & Co., A.G. March 22, 1946. 7598/1947.

Manufacture of di(alkoxyphenyl) haloethanes.—I.C.I., Ltd. March 27, 1946. 8314-17/1947.

Synthesis of a-acylamido-β, β-dimethylacrylic acid.—Merck & Co., Inc. March 22, 1946. 6687/1947.

Chemical compounds and processes for preparing the same.—Merck & Co., Inc. March 22, 1946. 7002/1947.

Chemical compounds and processes of preparing the same.—Merck & Co., Inc. March 22, 1946. 7003/1947.

EDUCATIONAL

Great Possibilities for QUALIFIED CHEMICAL ENGINEERS

VAST and far-reaching developments in the range of peacetime productions and markets of the Chemical Industry mean that the profession of Chemical Engineering will be of great importance in the future and one which will offer the ambitious man a career of outstanding interest and high status. The T.I.G.B. offers a first-class training to candidates for the Chemical Engineering profession.

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